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PAPERS FROM THE 1986 SOUTH ASIAN LANGUAGES
ANALYSIS ROUNDTABLE

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STUDIES IN THE LINGUISTIC SCIENCES

**PAPERS FROM THE 1986 SOUTH ASIAN
LANGUAGES ANALYSIS ROUNDTABLE**

EDITOR

Hans Henrich Hock

**VOLUME 17, NUMBER 1
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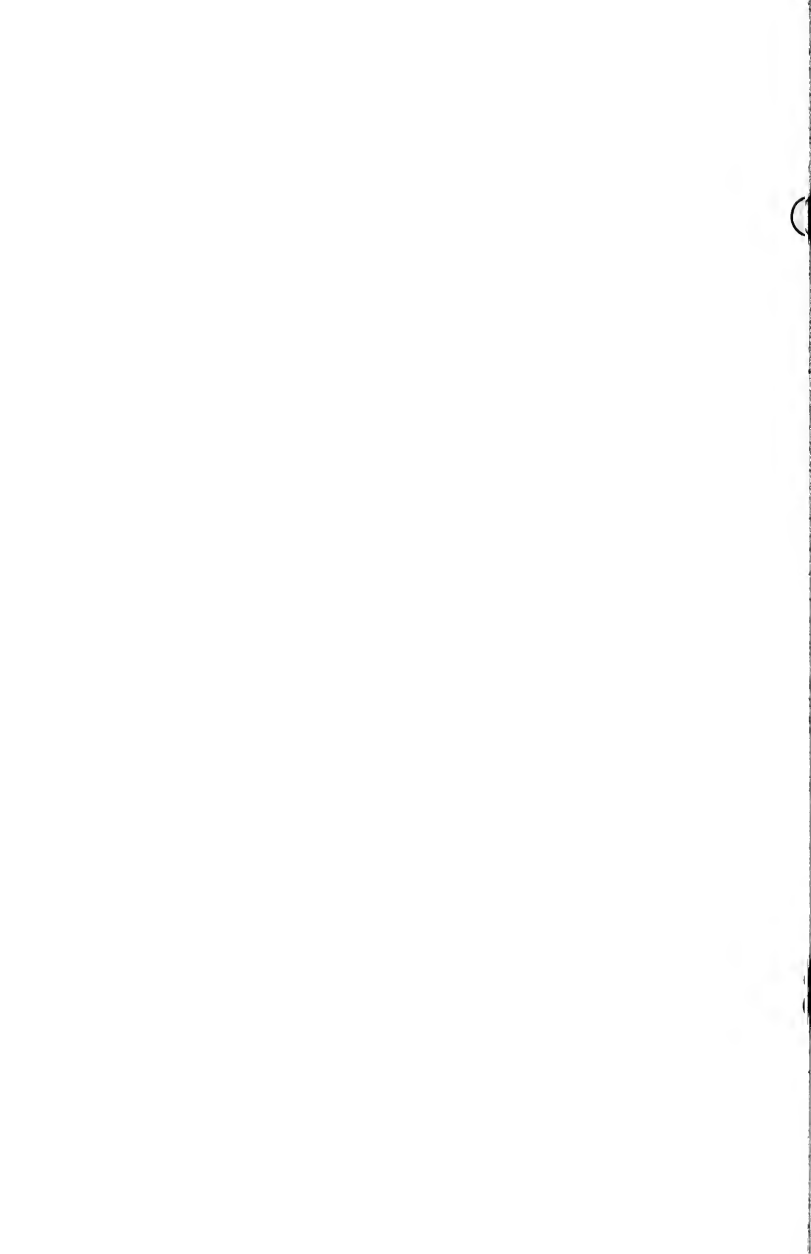


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PREFACE

This volume contains selected papers from the Eighth South Asian Languages Analysis Roundtable which was held at the University of Illinois in May 1986. The local organizing committee consisted of the following members, all South Asian linguists at the University of Illinois: Jean D'Souza, Hans Henrich Hock (Chair), Braj B. Kachru, Yamuna Kachru, Baber Khan, Mithilesh K. Mishra, Rajeshwari Pandharipande, Nalini Rau, Sarah Tsiang, and Tamara Valentine. The national committee consisted of the local committee plus Tej K. Bhatia (University of Syracuse), Edgar C. Polomé (University of Texas), and S.N. Sridhar (SUNY, Stony Brook).

The tradition of annual Roundtables dedicated to the languages, linguistics, and literatures of South Asia was started at the University of Illinois in 1979 and has been hosted altogether four times by the University of Illinois. It was inspired by a very successful Conference on South Asian Languages and Linguistics, also held at the University of Illinois, as part of the 1978 Linguistic Institute, and organized by Hans Henrich Hock and Braj B. Kachru.

The 1986 South Asian Languages Analysis Roundtable was held in conjunction with the 'Festival of India' and honored Edward C. Dimock, Jr. for his outstanding services and achievements in the support and promotion of South Asian studies. It was the longest Roundtable so far: Including a pre-session/colloquium on 'Modernization of Indian Languages and Literatures' (organized by Braj B. Kachru) and a post-session, the 'Second Symposium on Language Maintenance and Language Shift in South Asia' (organized by Tej K. Bhatia and S.N. Sridhar), it extended from 28 May to 1 June. It attracted more than eighty active participants, with more than seventy-five papers and presentations.

With the exception of two papers, all of the contributions to this volume were presented in general sessions of the 1986 Roundtable. Papers from the special panels are expected to be published separately. At this point, we have specific information on two volumes: The proceedings of the 'Symposium on Sanskrit Syntax' are being edited by Hans Henrich Hock, to be combined with papers from the 1987 'Second Symposium on Sanskrit Syntax' and to be submitted to an Indian publishing house. A volume of papers dealing with Government & Binding approaches to the syntax of South Asian languages is being prepared by Alice Davison (University of Wisconsin, as of 1987/88) and Kashi Wali (Universities of Cornell and Syracuse); it is planned to appear as a special issue of the Cornell University Working Papers in Linguistics. Other special volumes that are in the planning stage include 'Language and Modernization,' edited by Braj B. Kachru, and 'Language of Religion,' edited by Rajeshwari Pandharipande.

Last but not least, I would like to acknowledge the help of my colleagues, Braj B. Kachru, Yamuna Kachru, and Rajeshwari Pandharipande, in editing this volume.

Hans Henrich Hock
Editor

ASPECTUAL ELEMENTS OF SIMULTANEITY AND ITERATION IN INDIAN LANGUAGES:
A CASE FOR AN AREAL UNIVERSAL

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Reduplicated structures in the South Asian languages are used as markers of various aspectual distinctions. In the present paper, we concentrate on only two of those - aspects of simultaneity and iteration. In our discussion, we have relied on data from 30 Indian languages of the Indo-Aryan, Dravidian, Austro-Asiatic and Tibeto-Burman families. In our description of the aspect of simultaneity using reduplicated structures, we propose three subtypes of simultaneity and their interactions with lexical and grammatical aspects. The overall pattern that emerges is that within Dravidian, all sub-types of reduplicated structures with simultaneity function occur quite rarely in the southern literary languages and that their frequency increases with greater vicinity to the other Indo-Aryan and Munda languages in which the occurrence of these structures is more or less at 100%. Reduplicated structures with aspectual value of iteration occur in almost all the languages under investigation and therefore seem to be the most pan-Indian feature. By showing the large presence of reduplicated structures with function of simultaneity and iterative aspects in genetically unrelated Indian languages, we propose reduplicated structures as an areal universal.

1. In recent years, the topic of aspect has been investigated in a number of publications, including Comrie 1976, Friedrich 1974, Hopper 1979, 1982a&b, and Timberlake 1982. There are as many definitions and interpretations of the notion of 'aspect' as there are authors and schools. The Slavic School has always maintained a distinction between aspect and the category of Aktionsart ('kind of action'). However, it is not always clear where the boundary between aspect and Aktionsart is to be drawn and perhaps that is the reason why many authors, including Comrie, eschew the distinction altogether. Western linguists working on non-Slavic languages have conveniently defined aspect as all those phenomena which are not tense or modality. Authors like Timberlake (1982) regard aspect at the sentence or word/phrase level, while Hopper (1982a) restricts the term aspect to discourse level pragmatics and 'characterizable as completed event in the discourse'.

In the present paper we propose to look at the aspectual value of 'Reduplicated Structures' (henceforth RS) in Hindi and other South Asian languages. For the purposes of our discussion, we make a fundamental distinction between (at least) three types of aspect: (a) Lexical aspect, i.e. the inherent, semantically determined aspect of verbs. Compare the Hindi distinction between, say, bolnā 'speak' (imperfective/continuative)

and *gīrnā* 'fall' (perfective/completive/telic). For convenience, we limit the terminology to 'imperfective' vs. 'perfective'.

(b) The combined category tense/aspect, i.e. the grammatically determined aspectual reading of different tense-oriented verbal constructions, such as in Hindi

(1) *us ne kīṭāb parhī*
'He read a book' (perfective)

vs.
vo kīṭāb parh rahā thā
'He was reading a book' (imperfective)

Again, we will limit our terminology to 'perfective' vs. 'imperfective'.

Note that lexical aspect and tense-aspect ordinarily are independent of each other, so that both lexically perfective and imperfective verbs can occur in both perfective and imperfective tenses:

	lexically imperfective	lexically perfective
(2) perfective tense	<i>vo bolā</i> 'He spoke'	<i>vo girā</i> 'He fell down'

imperfective tense	<i>vo bol rahā thā</i> 'He was speaking'	<i>vo gir rahā thā</i> 'He was falling'
--------------------	---	--

(c) The aspectual meaning of reduplicated structures (RS) of the type (3) which will form the main topic of our discussion.

(3) *vo pān becte becte bolā*
He betel sell-imp. sell-imp. spoke
'He spoke while selling betels.'

Here, becete becte being verbal in nature and adverbial in function will be termed Reduplicated Verbal Adverbs (RVADV); for detailed discussion see Abbi (1975, 1980). As will be seen, lexical aspect and grammatical tense-aspect interact in a very interesting manner in these reduplicated structures.

2. The Indian languages have different morphological devices to indicate various aspectual distinctions. One of the most important and pan-Indian devices has been reduplicating verbal adverbs of the type (3). Reduplicated verbal adverbs (RVADV) in conjunction with the appropriate main verbs (MV) indicate four significant aspectual categories. They are:

- (i) Simultaneity
- (ii) Antithetical ('non-precipitative' action)
- (iii) Continuation-Duration
- (iv) Iteration

In the present paper we examine and concentrate on only two of these aspects — simultaneity and iteration.

3. **Simultaneity:** what might be called an aspect of simultaneity can be expressed in Indian languages by temporal phrases or clauses introduced by expressions like 'while. . .', 'at the time of. . .', and 'when. . .'. However, these languages also offer variant structures involving reduplicated structures (RS). It is not easy to determine for all languages whether RS are simple alternatives to temporal phrases or clauses, or whether they are preferred under certain conditions or disfavored under other conditions. Preference tests were found to be too difficult to administer and they tend to be highly subjective. However, for some languages we have responses from informants to the extent that RS is preferred in certain discourse contexts or is even the only acceptable structure. We leave this point open for further investigation and return to the notion of simultaneity as expressed by RS.

Simultaneity identifies the synchronization of two events or actions (non-states) at a particular point of time which in turn may signal:

- (A) the completion of both events or actions together; or
- (B) protraction of one of the events or actions; or
- (C) continuity of two events or actions for a certain period of time.

The two events or actions discussed here are represented by RVADV and MV. In unmarked order RVADV precedes MV, except in non-verb-final languages like Kashmiri and Khasi.

The semantic nature of the two events or actions entering into the relationship of simultaneity determines which one of the three readings above will obtain.

3.1 The diagrammatic representation of the aspectual reading of the type (A) would be as in figure 1.

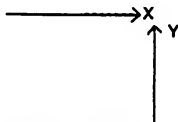


Figure 1. Simultaneity, type (A)

Here, as in the other figures which follow, the arrow marked X represents RVADV and the arrow Y represents MV. The constraint on the relationship of this type between RVADV and MV, at least in Hindi, is that both have to be lexically and grammatically (tense/aspect) perfective. Consider the following examples.

- (4) vo baiṭhte baiṭhte gīrā/gīr gayā
'He fell while sitting down.'

- (5) * vo baiṭhte baiṭhte gīrā hai
'He falls while sitting down.'
- (6) * vo baiṭhte baiṭhte gīr rahā thā
'He was falling while sitting down.'

(4) is grammatical because baiṭh 'sit' and gīr 'fall' are both lexically perfective and the tense/aspect of the total structure is also perfective. Sentences (5) and (6) are ungrammatical because though RVADV and MV are lexically perfective, grammatically (tense/aspect) the total structure is imperfective.

We have not made a detailed investigation of the other South Asian languages concerning this interrelationship between lexical and grammatical aspect on one hand and the aspectual reading of structures of the type (A). However, our data contain structures like the one in (7), in which a Hindi type (A) structure has at least surface parallels in the other languages. What needs to be further studied is whether these parallels are subject to the same restrictions as in Hindi. (In this and other later examples, the RVADV is set off by underlining).

- (7) 'x divided the property at the time of leaving the country'

HINDI: (x ne) deś chorṭe chorṭe dhan ka bāṭvārā kīyā

ASSAMESE: dekh erunte erunte hɔmptir bhāg korile

BENGALI: (Rām) deś charṭe charṭe sab sampati beṭe diye che

DOGRI: deś choḍde choḍde (one) dhanā dībād kiti

GUJARATI: deś choḍṭā choḍṭā (emne) paṭso wāto dīdo

KONKANI: deś soṛto soṛto (tenni) dUḍda wāṭletl

MARATHI: deś soṛṭā soṛṭā (taini) sampatti wāṭli

MAITHILI: deś chorait chorait (o) dhanak bāṭvārā kelak

ORIYA: deśɔ chaṛu chaṛu (se mane) dhano bāṭire

PUNJABI: mUlk chaḍde chaḍde than da bāṭvārā kīṭa

SINDHI: mUlk chaḍande chaḍande (hUnan) paise ja hīssā kaīyā

SADRI: deś chorṭe chorṭe dhan ke baiṭ deṭo

KABUI: kamal galou du du na śae

BIRJIA:	(hūku) des <u>bāe bāe</u> jo-joma hatlā laku
ORAON:	deś <u>ānte ānte</u> urme dhannan xoṭṭiyas ikccas
KHARIA:	ho?om <u>melāy melāy</u> kon hokki ba?a kamu kimē

These examples employ two lexically perfective verb forms - one as RVADV and the other as MV-, as in Hindi, choṛnā 'leave' and baṭvārā kamā 'divide', to show the synchronization of two events or actions which get completed at the same time.

What is interesting is that the Dravidian languages - Tamil, Malayalam, Kannada, and (marginally) Telugu do not show this kind of simultaneity by RS. Oraon (also known as Kurukh) is the single exception.

Hindi and other Indo-Aryan languages offer another interesting example of this kind of simultaneity between the verb (Hindi) baīnā 'strike (of a clock)' and the verb (Hindi) pahūcnā 'reach', both perfective verbs. (Note that although pahūcnā can occasionally be used imperfectively, in (8) it can only be used perfectly.) The Hindi construction is shown in (8) along with the parallels from other South Asian languages. This construction is not available in many of the Dravidian languages, including Kannada, Kodagu, Malayalam, and Telugu. Tamil and Oraon are the only Dravidian languages to have this construction. Kashmiri in Indo-Aryan and Melpet in the Tibeto-Burman family also do not exhibit this construction.

(8) The train reached Allahabad by the time it was 10 o'clock.

HINDI:	rāt ke das <u>baite baite</u> gāri lāhābād pahūci
ASSAMESE:	nikhav do <u>baicnte baicnte</u> tren lāhābād gol pile
BENGALI:	rāter dośtā <u>bāite bāite</u> tren lāhābād pōclo
DOGRI:	rāti das <u>baide baide</u> tren lābād puji gayi
MARATHI:	rātri dahā <u>vastā vastā</u> tren alāhābād la pahūci
KONKANI:	rātti dah ghaṇte <u>watte wate</u> ralla lāhābāda wasun pawle
PUNJABI:	rāta de das <u>baidvā baidvā</u> gaḍḍī lāhābāda puji
SINDHI:	ratja dhā <u>waiande waiande</u> gāḍī lāhābād pahuti
MAITHILI:	rait ke das <u>bajait bajait</u> tren lāhābād pahūcal
ORIYA:	dasaṭā <u>heyu heyu</u> tren ti elāhābādre pahuci gola OR prāy dastā <u>pākhā pākhī</u> tren ti elāhābādre pahuci gola

SADARI:	rāt ke das <u>baite baite</u> gāri Iāhābād pahuic galak
TAMIL:	mani patta <u>aḍikka aḍikka</u> vandi. Iāhābād ai crendao
ORAO:	maxāte das <u>baite baite/xarxanum xarxanum</u> rel Iāhābād arsjyā
BIRIJIA:	nind das <u>baje baje</u> te relgāri Iāhābād sōdōrenā
KHARIA:	idiba? a u? upha <u>baīenā baīenā</u> rel Iāhābād ḡām goḡki
MUNDARI:	das <u>baḷ jāna baḷ jāna</u> rel Iāhābād hiju tana
KABUL:	khwañ <u>lū lū</u> khou Iengāri Iāhābād khou gañtañe
PAITE:	daksom <u>agōngōn lañ</u> Iāhābād ka tuñta

3.2. The simultaneity of the type (B) can be diagrammatically represented as follows:

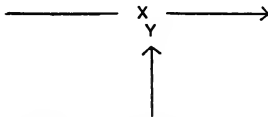


Figure 2. Simultaneity, type (B).

Figure 2 identifies those situations in which RVADV is lexically imperfective and MV is lexically perfective. As in type (A), the grammatical aspect of the entire construction is Hindi can only be perfective. Compare the examples in (9) and (10).

- (9) vo dōḡte dōḡte mar gayā (perfective)
'He died while running.'
- (10) *vo dōḡte dōḡte mar rahā thā (imperfective)
'He was dying while running.'

In situation of this type (9), the event or action denoted by RS may or may not be continued beyond the completion of the event or action manifested by the main verb (MV). For example, the Punjabi sentence (11) below may mean that the action caḡdā 'walking walking' was prolonged even after its coincidence with the action of ḡḡ peyā 'fell down'. If this were not so, the sentence in (12) would be ungrammatical, which it evidently is not:

(11) o caldă caldă qīg peyā
 he walking walking fell down
 'He fell down while walking.'

(12) o caldă caldă qīg peyā si tavi caldă reyā
 'He fell down while walking even then/still he kept walking.'

However, the same type of construction will be ungrammatical in type (A) constructions, where the RVADV is lexically perfective. Consider the example in (13):

(13) *o tren ca caṛdă caṛdă dīg peyā hor bād vi caṛdă reyā
 'He fell while boarding the train and continued to board the train thereafter.'

The possibility of continuation of one of the events/actions after being simultaneous with the other for some time is illustrated by the examples in (14).

(14) The boy fell down while walking.

HINDI: laṛkā calte calte gīr paṛā

BENGALI: chele colte colte/lete lete poṛe gelo

ASSAMESE: loṛā jāne jaūte jaūte pori gol
 OR

loṛtu khuj karhi karhi pori gol

MAITHILI: chāūra calait calait khaīs paṛal

ORIYA: puṇ cālu cālu puṛi galā

SADARI: chaUā jaite jaite gīr gelak

PUNJABI: muṇḍa caldā caldā qīg peyā

DOGRI: jāgat calde calde dīggi glyā
 OR

jaḡat saṛa ṭuri ṭuri tel payā

KASHMIRI: lackt̄ pyav pakān pakān vas'

GUJARATI: chokro cāltō cāltō p ḍī gayo

MARATHI: muḡa caltā caltā paḍlā

KONKANI: callo dhaUn dhaUn paḍlo

KANNADA:	hudugā <u>naṛitā naṛitā</u> sustādā OR hudugā <u>noḷḷedu noḷḷedu</u> sustādā
ORAON:	kukkos <u>ḷknum ḷknum/ekte ekte</u> khattaras keras
BIRIJIA:	sengo <u>sene sene</u> te thaka yana
MUNDARI:	kora hoṅ <u>sen sen</u> te UTUjane
KHARIA:	kongher <u>conā conā</u> gur goṭki
MEITEI:	añāñ adu <u>cat-na cat-na</u> coktha-ram-i
PAITE:	naupañ <u>pāi pāi</u> aketā
KABUI:	ganmaina <u>ta?lañ ta?lañ-na</u> bunkai kathe
GANGTE:	naupañ pa ču ci? <u>kɔm kɔm</u> Inapukt'āi

Another example of this type was found in all the Indo-Aryan, Tibeto-Burman, and Munda languages, while the Dravidian group showed some variations: Malayalam, Kannada (with some exceptions), and Telugu speakers emphatically denied the availability of such constructions in their languages, while Oraon, Tamil, and Kodagu speakers supplied the forms without hesitation. Compare the data in (15).

(15) While talking tears came into his/her eyes.

HINDI:	bāi <u>karte karte</u> uski ākhō me āsu ā gaye
KODAGU:	takka <u>parindanda parindanda</u> ippake kaṅṅle nir bāte
ORAON:	kasana <u>khirte khirte</u> khannati lɔ rkhatre
TAMIL:	<u>pesa pesa</u> avan kaṅṅil lirunda nir vaṛindada
THADO:	aho <u>pum pum</u> in amḷkhi apo ttā
KHARIA:	<u>kāyamnā kāyamnā</u> hokra? mon?nte ramo?ṅ da? abhore goṭki

It is difficult to explain why Tamil allows such construction, while Malayalam, Telugu, and Kannada do not. At this point, all we can say is that the simultaneity of the type (B) (discussed above) is not fully represented in the Dravidian languages.

3.3. Continuity of two non-perfective events or actions for a certain period of time can be diagrammatically represented as in figure 3.

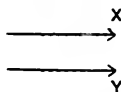


Figure 3. Simultaneity, type (C).

In this type of simultaneity, both the RVADV and MV are lexically imperfective and the tense/aspect of the total structure can be either perfective or imperfective. Compare the Hindi examples in (16) and (17).

(16) vo daurte daurte bolā (perfective tense/aspect)
'He spoke while running.'

(17) vo daurte daurte bol rahā thā (Imperfective tense/aspect)
'He was speaking while running.'

This structure is found in large variety of South Asian languages; cf. the examples in (18) and (19).

(18) HINDI: Kani calte calte gānā gā rahi thi
'Kani was singing a song while walking.'

BENGALI: o duray duray gān gāchilo
'He was singing a song while running.'

(19) 'He spoke while running (away)'

ASSAMESE: teū dauri dauri kɔ le

DOGRI: o nasde nasde bolya

GUJARATI: o dɔrto dɔrto bolyo

KONKANI: to dālto dālto sanglo

MARATHI: to dhauta dhauta manāīā

MAITHILI: o bhaqait bhaqait bājal

ORIYA: se paɾɔ paɾɔ kɔ hīla

PUNJABI: o dɔrdā dɔrdā bolyā

SADARI: u bhāgte bhāgte bollak

KANNADA:	avanu <u>vorā vorā</u> herdā
KODAGU:	avā <u>odiyanda odiyanda</u> takka arandata
ORAON:	ās <u>bhuṅnum bhuṅnum</u> bācas
MUNDARI:	nir <u>nir</u> bakharā tanaḷ
KHARIA:	hokkar <u>yartā yartā</u> gāmo
KABUI:	kamāi <u>pak? pak?</u> na śac
PAITE:	amā <u>tāi tāi</u> lai In apāu

Interestingly, the Dravidian languages in general, and Tamil in particular, do not exhibit R.S. of this type. Barring examples of the type (15) above, Tamil speakers do not use RS for simultaneity aspect.

3.4. In fact, from the examples examined so far, as well as from many others in our data collection, it becomes clear that in Dravidian, all subtypes of RS_3 with simultaneity function occur quite rarely in the southern literary languages and that their frequency increases with greater vicinity to the other Indo-Aryan and Munda languages in which the occurrence of these structures is more or less at 100%. Compare the percentages given in Table 1.

Oraon -	100%
Kodagu -	100%
Telugu -	60%
Kannada -	60%
Malayalam	33%
Tamil -	10%

Table 1.

The Indo-Aryan, Munda and the Tibeto-Burman languages show more or less 100% occurrence of the simultaneity aspect using RS.

3.5. Up to this point, we have examined the aspect of simultaneity in construction in which the agent of the RVADV and that of the MV have been identical. Now, we will show cases where the simultaneity of two events or actions involves two different agents. As far as we can tell, the aspectual relationship between RVADV and MV can be of the same nature as for the types (A), (B), and (C) above.

The sentences in (20) illustrate the situation. Most of the languages assign genitive marking to the agent noun of the RVADV.

(20) 'He drowned in my presence.' (Literal: He drowned with my looking looking')

HINDI:	mere <u>dekhite dekhite</u> vo <u>ḍub</u> gayā
BENGALI:	āmār <u>dekhite dekhite</u> śe <u>ḍube</u> gelo
ORIYA:	mu <u>dekhu dekhu</u> se buṛi gola
ASSAMESE:	Not available
SINDHI:	mUhI je <u>ḍīsande ḍīsande</u> hu buḍ: vyo
GUJARATI:	mhārā <u>johtā johtā</u> te <u>ḍubi</u> gayo
MARATHI:	mi <u>pahtā pahtā</u> to buṛla
PUNJABI:	mere <u>wekhdevā wekhdevā</u> o <u>ḍub</u> gyā
SADARI:	mor <u>dekhite dekhite</u> u <u>ḍub</u> galak
MAITHILI:	hamra <u>dekhīte dekhīte</u> o <u>ḍuib</u> gel
DOGRI:	mere <u>dikhde dikhde</u> o <u>ḍubbi</u> gayā
KANNADA:	nānu <u>noṛitta noṛitta</u> avanu mulugi hodana
ORAO:	eñhæ <u>erte erte</u> ās murkh Iyas karas
KODAGU:	nān <u>noṛianda noṛianda</u> iṇṇapakā avā muṛugī poci
MUNDARI:	lel lel te hun ui ujjane
BIRIJIA:	Not available
KHARIA:	lḥya?ā <u>yonā yonā</u> hokkar <u>ḍube</u> goṭki
METEI:	ai-na <u>una una</u> mahak Irakna rammi
PAITE:	kā? <u>et et</u> lāi Inatumtā
KABUJ:	āi hou <u>tan tannā</u> kamāi phānkāi gane
LAHULI:	giu <u>khāndā khāndā</u> du <u>ḍube</u> gi iti

For Tamil we could not get an example of the type (20). But note the acceptability of (21).

(21) TAMIL: rāman pustakam paḍḍike paḍḍike nān unnava tayāritten

'I cooked the whole dinner while Ram was reading the book.'

(Literally: Ram book reading reading I cooked the whole dinner)

When we examine our data for the simultaneity of two actions or events performed by two non-identical agents (as illustrated in (20)) the following pattern emerges: Tamil (with few exceptions), Telugu, Malayalam and Kannada (with few exceptions) in the Dravidian group, and Thado in Tibeto-Burman do not exhibit this type of construction. Assamese in the Indo-Aryan branch also does not offer simultaneity of two events or actions with two non-identical agents.

4. Iteration: What may be called an aspect of iteration, i.e. of the repeated occurrence of an event or action at short intervals of time is manifested in the following ways:

- (i) Reduplicated verbs with imperfective ending, and
- (ii) Reduplicated verb root followed by conjunctive participle (CP) marker.

These two possibilities can be exemplified by the Hindi examples (22) and (23) respectively.

(22) vo gānā sunte sunte thak gayā
He song listen listen tire went
'He got tired listening to the song.'

(23) vo gānā sun sun kar thak gayā
He song listen listen CP marker tire went.
'He got tired having listened to the song.'

The repetition of an action or an event represented by the RS might have a resultant effect on the action of the main verb (causal adverbs), or it might simply indicate the manner - one of the three types of simultaneity discussed above - in which the action manifested in the main verb is represented. Thus, (24) below is ambiguous between

- (i) He died because of eating (too much) food (causality)
- (ii) He died while eating food (simultaneity).

(24) vo khānā khāte khāte mar gayā
He food eat eat die went

(24) is an extreme case in the sense that context alone will provide the disambiguating cues. However, sentences of the type (24) are not always ambiguous because the semantic relationship between the main verb and the reduplicated iterative verb often clearly narrows down one of the two possible readings. (For detailed discussion, see

MUNDARI:	ñni durɔ ñ <u>aɪm keta aɪm keta</u> lagaɪn
BIRIJIA:	uni sɪriñ <u>ənum ənum</u> thakāyenā
KHARIA:	hokkar āloh <u>oŋɔr oŋɔr</u> thakke goŋki
MEITEI:	mahāk isai <u>iā-na iā-na</u> coktha rammi
PAITE:	amā iā nāi <u>khɪa khɪa</u> ɪn apuktā
LAHULI:	du gure <u>rewā rewā</u> chajilyā

5. **Conclusion:** As noted in 3. and 4. above simultaneity constructions using RS are fairly restricted in Dravidian. On the other hand, all the languages under consideration showed iterative construction (using RS). The iterative value therefore seems to be the most pan-Indian feature of reduplicated structures.

Moreover, the large presence of RS showing simultaneity and the near-total spread of iterative reduplicated structures in genetically unrelated Indian languages adds to the already available evidence for South Asia as a convergence area. Further work is required in neighboring languages such as those of South-east Asia and Iran to determine to what degree the phenomenon may extend beyond South Asia.

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A LEXICAL PHONOLOGY APPROACH TO HINDI SCHWA DELETION*

Camille Bundrick

In this paper I claim that D'Souza's (1985) non-linear account of Hindi schwa deletion can be improved upon by three insights that lexical phonology has to offer. First, the need for D'Souza's rule of initial accent is eliminated by establishing prefixes in Hindi as phonological words with regard to the operation of cyclic phonological rules. Secondly, speaker variability on deletion of suffixal schwas, also accounted for in D'Souza by the rule of initial accent, is explained by whether syllabification and foot construction apply on each cycle or post-cyclically. Finally, by considering schwa reinstatement as a post-cyclic rule, an explanation can be given for D'Souza's need for schwa reinstatement in the cases where speakers exhibit variation in schwa deletion in three-consonant clusters.

0. Introduction

Schwa deletion in spoken Hindi is a complex phenomenon that has intrigued linguists for a number of years. One reason that it continues to do so is that the phenomenon is not clear cut -- there is often variation among native speakers about which schwas delete and which ones don't. Unfortunately, past analyses, such as Ohala (1983) and D'Souza (1985), have run into the difficulty of adequately delimiting the potential deletion sites while at the same time accounting for speaker variation with a straightforward phonological rule, without resorting to a list of exceptions. The problem, I feel, is one not so much with the rule as with the phonological framework in which the rule is framed.

What I would like to propose in this paper is that schwa deletion in Hindi can best be accounted for in a framework of lexical phonology like that proposed by Kiparsky (1982), Mohanan (1981) and Rubach (1984). That does not mean that the previous approaches to the schwa deletion problem should be thrown out. Rather, the insights into the functioning of phonological rules made possible by the framework of lexical phonology can be successfully combined with the insights already made in the area of Hindi schwa deletion to eliminate what in the other approaches seem to be exceptions.

The paper will be structured as follows. First I will give an overview of the schwa deletion facts in Hindi. This will be followed by a brief description of lexical phonology. Then I will explain D'Souza's (1985) non-linear approach to Hindi schwa deletion. Finally, I will show how a lexical phonology treatment of schwa deletion handles both the deletion facts and what are treated as exceptions.

1. Overview of schwa deletion facts in Hindi

Schwa deletion most commonly occurs on verb and noun stems when a vowel-initial suffix is added. The resulting $a \sim \emptyset$ alternation can be seen in the following examples:

- (1) Verb:
verb stem past
- | | | |
|-------|-------|------------|
| nika | nika: | 'come out' |
| pekar | peka: | 'catch' |
| pičak | piča: | 'squeeze' |
- (2) Noun:
nom. sing. oblique pl.
- | | | |
|--------|----------|-----------|
| kamar | kamr+ḡ: | 'waist' |
| sabak | sabk+ḡ: | 'lesson' |
| ke:sar | ke:sr+ḡ: | 'saffron' |

Vowel-initial suffixes, however, do not always trigger schwa deletion in the stem. The schwa usually is not deleted if the deletion would result in a three-consonant cluster. That is, it does not apply if the schwa in question is either preceded or followed by a consonant cluster, as shown below:

(3) Schwa preceded by cluster:

<u>nom. sing.</u>	<u>oblique pl.</u>	
pustak	pustak+ḡ:	'book'
ki:rtan	ki:rtan+ḡ:	'song'
akšar	akšar+ḡ:	'letter'

(4) Schwa followed by cluster:

<u>nom. sing.</u>	<u>oblique pl.</u>	
paṅg	paṅg+ḡ:	'bed'
tilasm	tilasm+ḡ:	'magic'
daraxt	daraxt+ḡ:	'tree'

Some three consonant clusters, however, are acceptable, and schwa deletion can optionally apply in the speech of some native speakers in spite of a preceding or following cluster. For example, alternations as in (5) exist in spoken Hindi:

- (5) jungal+i: <-> jungl+i: 'wild'
do:ŋgar+i: <-> do:ŋgr+i: 'pertaining to hill people'

Another fact about schwa deletion is that, even though it does apply to a suffixed stem, it does not apply to prefixed stems, in spite of the fact that no three consonant clusters would ensue:

- (6) be+paṛḥ+a: --> bepaṛḥa: (*beṛḥa:) 'unread'
a:samay --> asamay (*asmay) 'inopportune'
a:mar+əṅ --> amaraṅ (*amraṅ) 'until death'

In addition, schwas located in suffixes are usually exempt from deletion. In (7) below, the schwa in question is in the second morpheme, and both the second and third morphemes are considered suffixes:

- (7) kala:+wat+i: -----> kala:wati: 'name for a girl'
 kari:+gar+i: -----> kari:geri: 'craftsmanship'
 ekaki:+pan+a: -----> ekaki:pana: 'loneliness'

There is, however, some speaker variation on deletion of schwas in suffixes. Ohala (1983) cites the following example, which will be dealt with in greater detail in section 4.

- (8) /bana:+wat+i/ ----> bana:wti: ~ bana:wati:
 'artificial' ('make' + nom. suff. + i:)

To sum up, there are three facts about Hindi schwa deletion that are important for a lexical phonology treatment. First, there is speaker variation as to which three-consonant clusters are an acceptable result of schwa deletion. Secondly, schwa is deleted only in a **suffixed** stem, but never in a **prefixed** stem. Finally, schwas located in suffixes are usually exempt from deletion, except for cases such as (8) above, in which speaker variation exists. After giving a brief background of lexical phonology in section 2, I will discuss D'Souza's non-linear approach to schwa deletion in section 3. In section 4, I will return to these three facts about schwa deletion, drawing on D'Souza's and Ohala's insights for a lexical phonology treatment of this phenomenon.

2. Lexical phonology: a brief background

Although lexical phonologists differ in the actual nuts-and-bolts description of the theory, several aspects remain constant across the different approaches to the theories. The first of these is that both morphological and lexical boundaries are relevant to the application of phonological rules. Each addition of a morpheme to a root creates a cycle, at which phonological rules apply to the part of the word that has been formed on that cycle. These phonological rules operate either alongside word formation, i.e. after each morpheme is added, or after word formation is complete, with the order of the addition of each morpheme made available through bracketing. The result of the application of the cyclic rules on all cycles is phonological words. After phonological words have been obtained, postcyclic rules apply, resulting in the phonetic representation. Also crucial to lexical phonology is the notion of strict cyclicity. According to Rubach (1984:12), the strict cyclicity principle 'requires that part of the structural description of the rule must be present in the domain of another cycle, i.e. no cyclic rule may apply to structures internal to a single cycle.' The implication of this principle is that cyclic rules cannot apply in morpheme-internal positions.

3. D'Souza's non-linear account of Hindi schwa deletion

D'Souza (1985) gives an excellent account of Hindi schwa deletion within the framework of non-linear phonology in terms of syllable structure and metrical feet. Her account utilizes a core skeleton consisting of unlabelled X slots to which vowels and consonants are linked, as shown below:



Vowels form the syllable head (denoted with a solid line) to which consonants are incorporated (shown by broken lines) in the following order:

- (10) First onset: $XX \rightarrow \overset{\cdot}{\underset{\cdot}{X}}X$, then coda $XX \rightarrow \overset{\cdot}{\underset{\cdot}{X}}\overset{\cdot}{\underset{\cdot}{X}}$

Long vowels are represented by two X slots and indicated thus:



The foot construction rule is: 'Build left dominant quantity sensitive feet beginning at the left edge of the word.' That means that the first syllable of a word automatically receives a strong branch of a foot, represented by \uparrow . In addition, any heavy syllable, meaning a syllable consisting of a long vowel or a vowel plus consonant, will be marked as strong. All other syllables will then be on a weak branch. Using the same examples as above, I will illustrate foot construction:

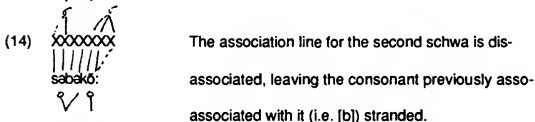
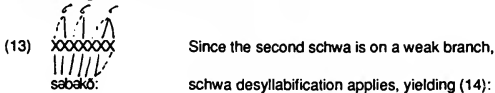


In sabakō, the first syllable, sa automatically receives a strong foot (\uparrow) via the left dominant foot construction rule. The second syllable ba, since it does not contain a long vowel or end in a consonant, receives a weak foot. The third syllable kō: has a long vowel and is therefore on a strong foot. The word ka:nta: has only long vowels, and so no weak feet are permitted. On the basis of this metrical analysis, D'Souza formulates the following rule to account for schwa deletion:



What this rule states is that, if a schwa is located on the weak branch of a foot, then the association line marking it as a syllable head is disassociated. The way this rule deletes a schwa in the phonetic representation is to assume that any element not in a syllable at surface structure is not phonetically realized (i.e. not pronounced).

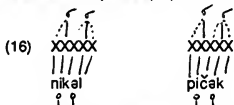
The following derivation illustrates these rules:



Syllabification rules then reapply, and the stranded consonant [b] is linked to the preceding syllable. The schwa remains unsyllabified and therefore is not pronounced:



This theory also nicely handles the cases where a schwa is followed by a single consonant, as shown in the examples in (16):



Within a quantity-sensitive framework as proposed by D'Souza, such a schwa would automatically be on a strong foot (long vowels and closed syllables are on strong feet), and thereby never be input to the schwa desyllabification rule.

Two problems for D'Souza's rule of schwa desyllabification arise when schwa deletion would result in a three-consonant cluster (See examples (3), (4), and (5) above.) First, one exception to D'Souza's schwa desyllabification rule exists when the deletion of a schwa preceded by a consonant cluster is subject to speaker variation, as in (5) (repeated below), and the speaker does not delete the schwa:

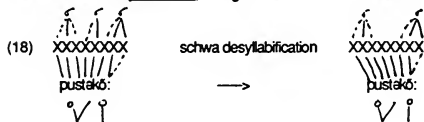


D'Souza's rule predicts that these schwas will **always** delete, because they are on a weak foot. Thus, the speakers who do not delete the schwa must be accounted for. A second problem arises when a schwa is preceded by a consonant cluster and followed by a single consonant (eg. [pustakó:]) According to the rule of foot building, these schwas (preceded by a cluster and followed by a single consonant) are on a weak foot, if the following consonant forms a syllable with a following vowel. But, even though it is on a weak foot, a schwa in this environment does not delete. To account for the unacceptable cases of schwa deletion resulting in a three-consonant clusters, D'Souza devises a schwa reinstatement rule, which resyllabifies the schwa for those speakers who don't delete it. This rule is:

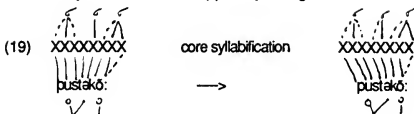


(where X' denotes an unsyllabified slot)

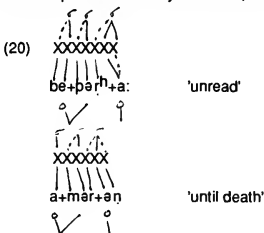
The derivation for pustakó:, using the schwa reinstatement rule, would be:



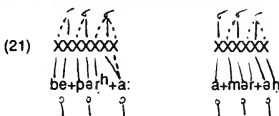
Schwa resyllabification then applies, yielding



Another case where D'Souza's analysis predicts schwa deletion, but where it does not apply is across a morpheme boundary to the left, as in:



In spite of the appropriate foot structure, where the schwas are predicted to be on a weak branch, the schwas do not delete. For these examples D'Souza posits a rule of *Initial accent*, which states that 'Every morpheme initial syllable is the head of a foot.' (p. 21) Thus, instead of the foot structures given in (20), the foot structure for these examples would be:



The reason for postulating such a rule is to prevent root-initial schwas from ever being in the right environment for the application of schwa desyllabification, thus preventing the application of the rule in these cases.

4. A lexical phonology analysis of Hindi schwa deletion

An analysis of Hindi schwa deletion seems ripe for a lexical phonology approach for two reasons. First, when accounting for the facts of schwa deletion, crucial reference must be made to morpheme boundaries, in that certain morpheme boundaries in Hindi **prevent** the application of the schwa deletion rule. Secondly, the process of schwa reinstatement discussed in D'Souza can be viewed as a natural postcyclic process in a lexical phonology framework. I will first discuss the involvement of morpheme boundaries in the rule of Hindi schwa deletion before returning to the question of schwa reinstatement.

As mentioned earlier, one morpheme boundary that is always taken into account by speakers of

Hindi is the one separating a prefix from the root. Following Rubach (1984) and his analysis of Polish prefixes, I will claim that prefixes in Hindi are 'phonological words,' and therefore do not take part in the cyclic phonological rules resulting from suffixation. Recall that, although prefixes in Hindi create the proper environment for schwa deletion in roots, the schwa does not delete. To illustrate:

(22) UR:	paɾʰ	'read' present tense
affix:	paɾʰ+a:	'read' past tense
affix:	[be][paɾʰ+a:]	'unread'

When affixed in this way, prefixes can never trigger deletion, whether syllabification and foot building apply lexically, i.e. after each affixation, or post-lexically. Because the prefix is considered to already be a separate phonological 'word,' it is therefore not subject to the cyclic rules of the word formation process. A similar process occurs in English, accounting for the differences in the phonological behavior of the prefixes in- and un-. Although the [n] in the prefix in- assimilates to a following liquid or stop (illegal, irreplaceable, impolite, etc.), the [n] in un- never assimilates (unlawful, unpopular). Thus it has been claimed that un- is a phonological word, and as such, is prevented from undergoing the cyclic assimilation process that in- undergoes.

Another area where schwa deletion in Hindi is sensitive to morpheme boundaries concerns schwas in suffixes. D'Souza's account handles these seeming exceptions with the rule of initial accent, which specifies that every morpheme-initial syllable be the head of a foot. Thus, the schwa in a word which exhibits speaker variation, such as /bana:+wat+i:/ (see (8) above or (23) and (24) below for the variation), could never delete, since it is not on a weak foot. Schwas in suffixes which do delete thus raise problems for D'Souza's approach. Apparently, the rule of initial accent is not adequate to account for these data. M. Ohala (1983), in her very extensive linear phonology account of Hindi schwa deletion deals with this type of variation in a different way. Ohala's explanation for the difference in pronunciation is that some speakers 'know about' the morpheme boundaries and others do not (p. 133). That is, those who know about the morpheme boundary would say [bana:wati:], whereas those unaware of the boundary would say [bana:wti:]. If we assume that Ohala is correct, then an analysis incorporating D'Souza's account into a lexical phonology framework is possible. For the speaker unaware of the morpheme boundary (Speaker A below), the pronunciation [bana:wti:] could be derived by first applying word formation rules and then doing syllabification and building feet. But for speakers aware of the morpheme boundary (Speaker B below), the pronunciation [bana:wati:] could only be obtained by first syllabifying, building feet, and then doing word formation. In other words, for Speaker A, schwa deletion is a post-lexical rule, whereas for Speaker B, it is a lexical rule. A derivation of the two pronunciations of /bana:+wat+i:/ will illustrate this point:

(23) Speaker A (unaware of morpheme boundary)

UR:	bana:
affix.:	bana:+wat
affix:	bana:wat+i:

syll.struc.
& foot str.

bana:wati:

a-desyll.
& resyll.

bana:wati:

PR: [bana:wati:]

(24) Speaker B (aware of morpheme boundary)

UR: bana:

affix.: [bana:]wat

syllab. &
foot str.

[[bana:]wat]

affix.: [[[bana:]wat]:]

syll. struc.
& foot str.

[[[bana:]wat]i:]

PR: [bana:wati:]

By allowing the syllable structure and foot building rules to apply either on every cycle or after the cyclic word formation rules have applied, we can account for the two different pronunciations rendered by native speakers of Hindi.

As a final point, recall from the earlier discussion that a schwa surrounded by three consonants sometimes deletes and sometimes doesn't, depending upon whether the speaker finds the resulting three-consonant cluster acceptable. (See (5) above.) D'Souza's approach tries to account for the differing pronunciations given by different speakers by proposing a schwa reinstatement rule for speakers who do not accept the triple cluster. Since the X slot linked to schwa in her account 'holds' the place where the schwa was disassociated, schwa reinstatement requires only a simple rule of resyllabification.

Utilizing aspects of D'Souza's theory then, I would like to suggest that schwa reinstatement is a postlexical rule. In that way, the schwa can be disassociated by the rules of syllabification and foot building during the cyclic word formation process. Then, since the X slot still holds the timing slot for

the disassociated schwa at the postcyclic level, the schwa can be reinstated to break up unacceptable clusters on an individual basis. Since the native speakers of Hindi that Ohala cited differed on the clusters each felt were acceptable, this seems to be the only tenable approach.

5. Conclusion

To sum up, there are three main improvements that a lexical phonology approach offers to D'Souza's non-linear account of Hindi schwa deletion. First, by establishing prefixes in Hindi as phonological words as far as cyclic phonological rules are concerned, the need for the application of D'Souza's rule of initial accent to account for why the schwas in prefixed stems do not delete is eliminated. Secondly, the variability of speakers deleting suffixal schwas is explained by whether syllabification and foot construction apply on each cycle or post-cyclically. Finally, by considering schwa reinstatement as a post-cyclic rule, an explanation can be given for the speaker variation in schwa deletion in three-consonant clusters.

NOTE

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WH-MOVEMENT IN HINDI-URDU RELATIVE CLAUSES*

Alice Davison

Relative clauses in Hindi-Urdu do not have obligatory movement of the relative NP to pre-sentence COMP position in surface structure, unlike in English and other languages. Yet relative NPs in situ may have semantic scope over more than the clause containing the relative NP, just as though it was moved to a \bar{c} -commanding COMP position determining the semantic interpretation of the relative and other clauses. Further, the possibility of having scope over more than one clause is limited by syntactic factors, like the Bounding restrictions (or subjacency requirement) limiting syntactic movement. The restrictions in Hindi-Urdu are based on the relation of the internal clause to a governor. Hindi-Urdu is a head-final language, with government to the left. Relative NPs may have multiple-clause scope over left-branching clauses. It is proposed that in Hindi-Urdu, the analogue of wh-movement takes place in the derivation of Logical Form, rather than S-Structure, and is limited by a government-based restriction rather than Subjacency.

Introduction: The main purpose of this paper is to contrast the syntactic structures of languages like English, with obligatory wh-movement, with languages like Hindi-Urdu which allow in situ relative phrases. As we will see shortly, though English and Hindi-Urdu differ in surface syntactic structure, the relative phrases have in common the same semantic scope relations and are subject to analogous constraints on possible scope relations. The principal issue in this paper will be the syntactic representation of semantic scope relations, and how conditions on possible scope relations are represented in English and Hindi-Urdu.

In this paper, I will be discussing relative clauses of the form shown in (1) below:

- (1) [laRkee-nee **joo kItaab**; curaaai] (voo usee; vaapas kar deegaa)
boy-erg. which book steal-perf. he it-DAT return give-fut.
'The boy will return the book [which; he stole e].'

The square brackets enclose the relative clause, which will be the main focus of the paper. Within the relative clause, the boldface relative NP **joo kItaab** 'which book' is surrounded by the other constituents of the relative clause. It is not moved obligatorily to the left-most position in the clause (although there is a tendency for relative NPs to occur in first or second position in the clause). In the sentence in (1), the relative NP occurs in the same preverbal position that it would occupy in a non-relative clause by virtue of being a direct object.

In this respect, the relative NPs of Hindi-Urdu contrast sharply with English relative operators like *which*, as illustrated in (2) and (3). The English sentence in (2) is ill-formed because the relative phrase *which* occurs in situ, in the direct object position which the corresponding non-relative NP would occupy in an ordinary clause. Instead, the relative phrase must be moved to a left-most, preclausal, or COMP position; cf. (3).

- (2) *The boy will return the book [COMP [he stole which.]]
 (3) The boy will return the book [COMPwhich [he stole e.]]

In Hindi-Urdu, relative phrases may occur in situ, and are not obligatorily moved to COMP position in the formation of surface syntactic structure (S-Structure). In English, relative phrases must be moved to COMP in the derivation of S-Structure.

The reference of the relative phrase, or its semantic scope, is determined in English by its syntactic position in COMP. Since COMP is a sister of S, immediately dominated by S', the relative phrase ζ -commands S and all its subconstituents. In English, the semantic scope of a relative phrase corresponds to what the relative ζ -commands at S-Structure. Since structural relations established in S-Structure carry over to Logical Form (LF) (unless some allowable change occurs), the ζ -command relation also holds at LF, which is the input representation to semantic interpretation. We can now make the first assumption about languages with relative phrases in situ in S-Structure: In these languages, the semantic scope of relative phrases will be determined in the same way as in languages with syntactic movement, that is, by the syntactic relation of ζ -command. However, this will hold only in Logical Form, a level of syntactic representation derived from S-Structure by the application of syntactic movement (cf. Huang (1982)).

Semantic and syntactic scope: In languages like English, with obligatorily moved relative phrases, the position of the relative phrase in S-Structure has semantic consequences. These are not immediately evident in the case of a simple monoclausal relative illustrated in (1) and its English counterpart in (3). Nevertheless, the reference of the relative NP in (1) or (3) is determined with reference to the clause in which it originates: It isn't just SOME book which is referred to, but the book having the property that the boy stole it. The interpretation of *which* in (4a), is still different. The reference of the relative phrase here is determined both by the clause of origin and by the clause containing that clause, they think S'.

- (4) (a) The book [which [they think [that he stole e]]] was mine.
 (b) They think [that the book [which [he stole e]]] was mine.

In sentence (4b), the reference of *which* is again as in the simple structures, (1) and (3), even though the sentence contains both the clauses he stole e and the matrix clause they think S'. The position of *which* in S-Structure is what conveys the semantic scope of the relative operator. Assuming that each clause S' consists of COMP and S, then the semantic scope of the relative NP corresponds to the COMP position which the relative phrase occupies.

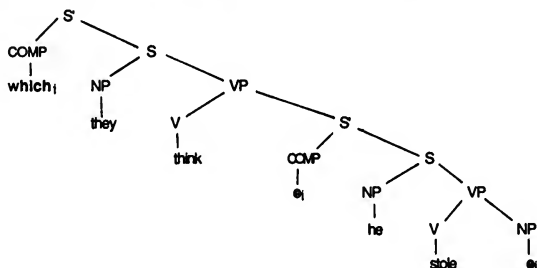
In the case of monoclausal relative structures like (1), the relative phrase has scope over its clause of origin. But in more complex cases such as (5), the relative phrase [j]s aadmil koo 'which man (dat.)' has scope over both an internal clause (S₁) and its matrix clause (S₂):

- (5) [pulis [j]s aadmil-koo PRO bam rakhnee-kaa doošii maantii hai]
 police which man-DAT bomb place-inf. of guilty believe is
 S₁ S₂
 (mujhee pakkaa višvaas hai ki voo nirdooš hai.)
 I-DAT firm belief is that he innocent is
 'I firmly believe that the man is innocent [who [the police believe [e to be guilty of setting the bomb]]]

The relative NP is in situ inside a subordinate clause in S-Structure, as shown in (5), but it will be assumed to move to the COMP position of the matrix clause in the derivation of Logical Form. There, its semantic scope is determined with reference to its syntactic position in a syntactic and semantic representation. How this occurs and what conditions it is subject to will be shown in more detail shortly.

Returning to languages like English which have obligatory *wh*-movement, we note that syntactic movement from the site of origin to a position in COMP is assumed to take place in very specific ways, subject to conditions on well-formed movement. This is illustrated in the tree structure in (6):

(6) Syntactic movement to COMP in the derivation of S-Structure:



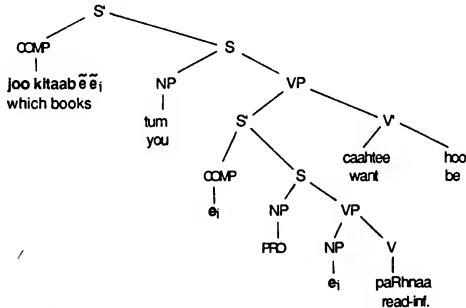
In D-structure, the representation in which lexical subcategorization is satisfied (cf Chomsky 1981), the relative phrase *which* originates in a syntactic direct object position and so satisfies the subcategorization of *steal* for an object. It receives the semantic theta role of 'patient' which *steal* assigns to that position. Since this position has an associated theta position, and since an NP may have one and only one theta role assigned to it (Chomsky 1981), the NP may move only to a position to which no theta role is assigned. COMP is one such position. Movement is to the nearest COMP position, or else the subadjacency condition would be violated. This condition stipulates that between the source of a moved NP and its destination or landing site, only one cyclic node (NP or S) may intervene. Movement from COMP may only be to another COMP site, because of the nature of the empty category created by *wh*-movement, which can have an antecedent only outside of S (Chomsky 1981, 1982). Hence the two instances of movement in (6) are well-formed. The interpretation in which the relative phrase has scope over two clauses is based on a well-formed syntactic structure in which the relative has come to *g*-command two clauses from COMP.

A very similar Hindi-Urdu sentence is illustrated in (7):

- (7) [tum [PRO joo kitaabẽẽ paRhnaa] caahtee hoo] vee ghum gail haŋ.
 you-fam. which books read-inf. want be they wander go-perf. are
 S₁ S₂
 'The books [which [you want [PRO to read e]]] have gotten lost.'

In this sentence the relative phrase joo kitaab e e_i also has scope over two clauses: its own clause of origin and the matrix clause. Though no syntactic movement has occurred in the derivation of the S-Structure (7), let us assume that in Hindi-Urdu, as well as in other languages, semantic scope is determined by syntactic scope. Since the semantic scope of the relative phrase includes the matrix as well as subordinate clause, this assumption means that joo kitaab e e_i must \bar{c} -command both clauses at some level of representation, in this case, in Logical Form. The tree structure in (8) illustrates syntactic movement of a relative phrase to COMP in LF:

(8) Syntactic movement in the derivation of Logical Form:



The derivation shown in (8) is very similar to the one in (6). Many of the conditions on well-formed derivations also hold here. Movement takes place from a theta-marked position, the position of the direct object of *paRhnaa* 'read-inf.' to a non-theta position in COMP of the embedded clause, and then to the COMP of the matrix clause. This meets the theta criterion which allows no more than one theta role to be assigned to an NP. For reasons which cannot be given here in detail because of limitations of space, we cannot incorporate Subjacency directly into the grammar of Hindi-Urdu as a well-formedness condition on movement in LF. Instead, I will discuss below the specific conditions on wide and narrow scope readings which are realized in Hindi-Urdu.

Before going on to a statement of well-formedness conditions, I want to comment on the syntactic structure of the embedded clause given in (8) for the sentence in (7), particularly the presence of COMP in the embedded clause. This clause differs from the embedded clause in (6) in an important way. In the English sentence in (6), the embedded clause is the object of *think*, which takes either a finite sentential complement, as in (6), or a non-finite 'small clause' such as the NP-NP complement in (9).

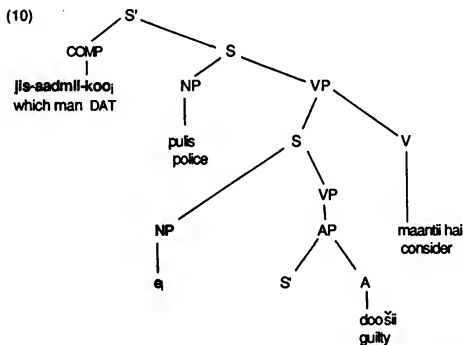
(9) We think [John a fool].

In Hindi-Urdu, the verb *caahnaa* 'to want' takes a non-finite infinitive/gerund complement, with a null subject PRO, which must be coindexed with the matrix subject, as in (7). This complement clause must precede the verb. (The same verb also allows a finite clause with a lexically realized subject, not necessarily identical to the matrix subject. We will return to this structure below.)

If the object of the matrix verb is an infinitive/gerund in Hindi-Urdu, it might be argued that such complements have clause-like structure, with subjects and objects, but are not really clauses. In particular, we might ask if the complement has a COMP position dominated by S'. If COMP is absent from the complement clause, its absence would explain immediately why the relative phrase *joo kitaab ē ē* has wide scope over two clauses, and in fact MUST have wide scope. It appears in the matrix COMP because it has nowhere else to go, if this hypothesis is right.

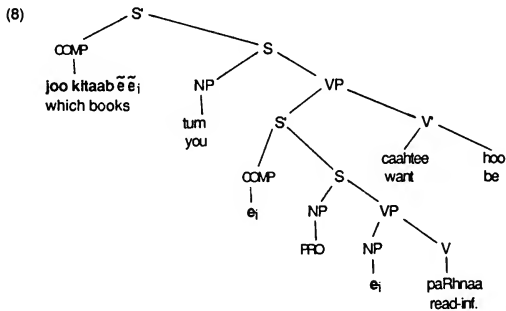
But there is evidence that this explanation is not correct for all complement clauses. There are SOME complement clauses for which it is correct, but these have special properties. The sentence in (5), reproduced below, is one such example of a non-finite complement clause which lacks S'. Its LF structure is shown in (10).

- (5) [pulīs [jīs aadmī-koo [PRO bam rakhnee-kaa dooṣīi maantīi hai]]]
 police which man-DAT bomb place-inf. of guilty believe is
 S₁ S₂ S₃
 (mujhēe pakkāa viśvaas hai ki voo nirdooṣ hai.)
 I-DAT firm belief is that he innocent is
 'I firmly believe that the man is innocent [who_i [the police believe [e_i to be guilty of setting the bomb]]]



The relative phrase is extracted from subject position of the complement of *maantīi hai* 'considers, believes'. The relative NP has an unusual marking for a subject, the dative-accusative postposition *-koo*. This postposition is 'exceptionally' assigned by verbs like *maanna* 'to consider', *samajhna* 'understand, know', *deekhna* 'to see', to the subject of the complement clause. Case is usually assigned by verbs within a clause, because clause boundaries, or S', block case assignment. So this type of case marking is anomalous without some special provision which allows it. As the tree structure in (10) illustrates, the special provision is the deletion of the S' and COMP of the embedded clause complement to *maantīi hai*. The verb of the matrix clause governs the complement clause subject position and assigns it case, since no S' node intervenes.

If we extend this analysis to other cases, however, we find that it contradicts other principles of the grammar. The sentence in (7) and (8) has a non-finite complement with a null subject or PRO. This kind of empty category occurs ONLY in ungoverned positions, to which no case is assigned. Infinitive subjects are typically null and ungoverned because the governor and case assigner of the subject position in finite clauses is absent from non finite clauses—this is INFL or the inflection and agreement constituents of finite clauses. When PRO occurs in the subject position of a non-finite clause, it is governed neither by an element of its own clause nor by any element of the matrix clause. PRO is protected by S' from being governed by a matrix clause verb. Referring back to the proposed LF structure of (7) in (8), we see that the presence of S' in the embedded clause protects PRO from being governed in the matrix clause.



Since there are theoretical reasons to assume that S' is present, it is natural to assume that also COMP is present in the embedded sentence. Hence we will represent all embedded sentences as having S' and COMP unless there are some special reasons (as in the Exceptional Case Marking contexts of (5) and (10)) to believe that S' is deleted.

Conditions on well-formed movement to COMP: We now return to the question of what special restrictions there are on the movement of the relative operator to COMP. For Hindi-Urdu, it appears that semantic scope, dependent on syntactic scope, is correlated with the position and role of the clause of origin. There are verbs in the language which allow two kinds of complement. One type is the kind just discussed, a non-finite clause which occurs in preverbal position, as in (5) and (7). The same matrix clause verbs allow another kind of complement, which is finite and occurs to the right of the verb. The contrast is shown in (11) for a complement clause not containing a relative operator.

- (11) (a) pulis [[us - aadmii-koo coor] samajhtii hai]
 police this man dat. thief believe is
 'The police believe [this man to be a thief].'
- (b) pulis samajhtii hai [ki voo aadmii coor hai]
 police believe is that this man thief is
 'The police believe that this man is a thief.'

The sentence in (5) contains a more complex clause with the same structure illustrated in (11a), and with a relative operator inside the embedded clause. This relative operator has wide scope over both its clause of origin and the matrix clause. The alternative structure with a finite complement clause would be the sentence in (12):

- (12) [pulīs sooc rahī hai [ki jīs aadmīl-nee/|n-|n aadmīlōō-nee bam
 police think prog. is that which man-erg /which-which men-erg bomb
 S₁ S₂
 rakhaa] mujhee yah pakkaa viśvaas hai ki voo nirdooś hai.
 placed I-DAT this firm belief is that he innocent is

(a) 'Wide scope' reading:

I firmly believe that the man is innocent **who** the police believe **e** set the bomb;
 I am convinced [that **whoever** the police believe **e e** set the bomb] is
 innocent.

(b) 'Contradictory' reading:

'The police believe [that **whoever** (really) set the bomb, I am convinced that
he is innocent].'

The structure in (12) is exactly analogous to (5), which has the wide scope reading and which in fact must have the wide scope reading because of the deletion of *S*' and *COMP*. The question, then, is whether the wide scope reading is possible in (12) for the relative phrase *jīs aadmīl-nee*, or the 'generic' reduplicated version *|n-|n aadmīlōō-nee* 'which man, whichever men-erg.'. Judgements are very mixed about the interpretation and well-formedness of this sentence. Some speakers will say that the wide scope interpretation (12a) is possible for (12), though the structure (5) is preferable.¹ Others find the structure well-formed only if it has a different constituent structure, as in (13), which corresponds to a contradiction-of-beliefs reading, as in (12b). For these speakers, wide scope is not permitted out of a finite clause to the right of the matrix verb.

- (13) pulīs sooc rahī hai [ki [jīs aadmīl-nee/|n-|n aadmīlōō-nee
 police think prog. is that which man-erg / which-which men-erg
 bam rakhaa] mujhee yah pakkaa viśvaas hai [ki voo nirdooś hai]
 bomb placed I-DAT this firm belief is that 3 sg innocent is

'The police think that [I believe [whoever set the bomb] is innocent].'

The conditions on well-formed movement to *COMP* can be summarized as follows:

- (14) *COMP* to *COMP* movement may not take place out of
 (a) right branch (finite) clauses
 (b) if these clauses are adjuncts and not subjects or objects.²

Speakers who reject the wide scope reading (12a) adhere to condition (14a), which prohibits *COMP* to *COMP* movement from any finite clause which is a right branch in any phrase. Those who accept the wide scope reading (12a) also have the condition (14b), which says that right branch finite clauses which have the status of being the argument of a verb, a subject or object, permit movement out of *COMP*. This distinction describes the differences of speakers' judgements about (12) and means that no speaker should accept wide scope readings out of finite, right branch adjunct clauses, adverbial or modifier clauses not subcategorized by a verb.³ (A similar pattern is found for constituent questions.)

There are contrasts of exactly this type, in which a wide scope reading is readily available out of a non-finite, left branch adjunct clause, but not out of the corresponding finite and right branch versions. For example, the wide scope reading is possible for **jls kitaab-koo** in (15). Here, the postposition **see** 'from' (in boldface) is the head of the phrase in which the internal clause is a left branch. The relative phrase has scope over both S₁ and S₂.

- (15) [[meeree bhaai-kee jls kitaab-koo paRnee **see**] maĩ gussaa hoo gaii]
 my brother-of which book DAT. read-inf.from I angry become perf.
 (voo kitaab acchii nahĩĩ thii).
 that book good not was

The book which_i I got angry on account of my brother's reading e_i was disgusting'.

The sentence in (16) should be the counterpart of (15), except that the adjunct clause is a right branch of the preposition **kyõõ ki** 'because'. However, this sentence is ill-formed if it is meant to be synonymous with (15). It has a different reading and constituent structure; cf. (17).

- (16) *[[maĩ gussaa hoo gaii [kyõõ ki meeree bhaai-nee joo kitaab paRhi
 I angry became because my brother-erg. which book read
 (voo kitaab acchii nahĩĩ thii)
 that book good not was

The book which_i [I got angry because my brother read e_j] was disgusting'.

- (17) I got angry [because the book [which my brother read e_j] was disgusting.

In the (15)-(16) reading, the cause of anger is that one's brother read the book, which independently was a nasty book. In the (17) reading, the nasty quality of the book AND the fact that my brother read it are the causes of anger. In the (15)-(16) reading, the relative phrase has scope over the reason clause. In the (17) reading, the reason clause contains and has scope over the relative clause. In the (17) reading, the relative operator has narrow scope, over only its clause of origin.

Relative phrases in Hindi-Urdu have semantic scope over their clauses of origin. Whether they have wide scope over matrix clauses, too, is dependent on the syntactic relation of the embedded clause to the constituent which it is a sister of, the verb or adposition in the matrix clause. If the embedded clause is a non-finite and left branch clause, a relative phrase within it in S-Structure may have wide scope over the matrix clause at LF, whether or not there is an intermediate COMP, as in (7), and whether or not the clause is an argument, as in (7), or an adjunct, as in (15). If the embedded clause is a finite and right branch clause, a relative phrase within it may for some speakers not have wide scope at all (cf. Condition (14a)). For others, wide scope is allowed out of a finite clause only if it is an argument, as subject or object 'connected' with the verb of the higher clause. If it is an adjunct, wide scope of a relative phrase is never possible, as in Condition (14) b. These are informal and specific conditions on when relative operators may move to the matrix COMP and so c-command the matrix clause.S

In spite of the formal differences at S-Structure between languages with in situ relatives and relatives which move to COMP obligatorily, there are common issues which involve semantic scope. The commonality of semantic scope relations can be represented formally in

terms of syntactic relations and syntactic conditions on well-formed movement to COMP. The differences between languages can be stated in terms of when syntactic movement to COMP is required, in deriving S-Structure or Logical Form.

NOTES

*I am grateful to Baber Khan, Chandrika Kaul, Manoj Jha, and Abha Gupta for judgements about the Hindi-Urdu sentences, and to James Gair, Yamuna Kachru, and Andrea Tyler for helpful comments.

¹There are alternative ways of expressing this meaning, using two finite clauses. The relative phrase which is intended to have scope over the matrix clause occurs in the matrix clause in S-structure. It is coindexed with a pronoun (null or overt) in the embedded clause, giving the equivalent of semantic scope over two clauses via movement in LF:

- (1) pulls jIs-aadmil-koo/jIs aadmil kee baaree- mēē maantii hai
 police which man DAT / which man of concerning considers
 ki Ø/voo coor hai, ...
 that he thief is
 'The man concerning whom the police think that he is a thief.'

²What is expressed here as a set of stipulations can be phrased in more general terms. For example, since movement in LF leaves an empty category in the S-structure site of the relative phrase, the conditions on movement can be expressed in terms of conditions on coindexing an empty category with an antecedent which \bar{g} -commands it. One such proposal is the Connectedness condition of Kayne (1983), which defines a connected tree between the empty category and the antecedent, made up of government relations and X' projections. This proposal would give the same results as the conditions in (14) if non-finite, left branch clauses are always governed, allowing connectedness between embedded and matrix clauses. Finite, right branch clauses are never governed, except through argument relations, and only for some speakers. This condition excludes adjunct clauses if they are right branches.

³J. Gair suggests that the conditions (14) may hold for all speakers, but not all speakers may perceive an argument relation between the matrix clause and the embedded sentence if the embedded clause is not in the normal position of an embedded subject or object clause. Similar distinctions exist for constituent questions between argument position to the left of the governor and adjunct positions to the right. Wide-scope readings are not permitted for constituents in non-finite subordinate clauses postposed to the right of a verb. Directionality rather than tense is the deciding factor.

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THE DEVELOPMENT OF PERSONAL PRONOUNS IN MODERN GONDI

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Abstract

Gondi, a Dravidian language, exhibits a bewildering multiplicity of pronominal variants which cannot be derived from a single proto-form. A comparison of Proto-Gondi personal pronouns with similar reconstructions in the other Dravidian languages suggests that the variation among personal pronouns is not a phenomenon exclusive to Gondi but can be traced to Proto-South Dravidian. However, there remain a number of variants unaccounted for by the reconstructed forms. The development of these variants is attributed to the loss of distinction between second singular and plural nominative forms and subsequent efforts toward the restoration of the distinction.*

1.0 Introduction:

Gondi, the language of the Gonds or Koytor (as they call themselves), is one of the most widely spoken nonliterary languages, with two million speakers spread over a large tract of Central India.

It has been observed that Gondi exhibits a great deal of variation from one region to another, more in phonology than in morphology and syntax. There are at least ten speech varieties identified by the variation in personal pronouns. The bewildering multiplicity of pronominal variants found in Gondi is unprecedented in any other language of the subcontinent. Each pronoun has a number of regional variants, and the use of more than one alternant in the same dialect is not uncommon. In the following sections the source and the development of variation in personal pronouns will be discussed.

2.0 The data:¹

Personal pronouns in Gondi are distinguished for person (first (1) and second (2)) and number (singular (sg.) and plural (pl.)). Each pronoun has at least two forms, a free form, which occurs in the nominative (nom.), and a bound form, which occurs elsewhere. The latter is referred to as oblique base (obl.).

2.1 The singular forms of the first and second persons have two major variants, one with an initial nasal and the other without, as shown in (i) a. and b.

(1) a. First person singular forms:

nom.	obl.	Geographical distribution
ana	nā-	Sehore, Hoshangabad, Betul, Chindwara, Amraoti, and Nagpur.
nana, nan	nā-	Akola, Nagpur, Wardha, Yeotmal, Bhandara, Balaghat, Seoni, Mandla, Durg, Chandrapur, Bastar, Nanded, Adilabad, Khammam, and Koraput.

(1) b. Second person singular forms:

ima, uma	nī-	Sehore, Hoshangabad, and Balaghat.
ima, ime	nī-	Betul, Amraoti, Akola, Wardha, Nagpur, Yeotmal, Chindwara, Seoni, Mandla, and Balaghat.
nima, nim	nī-	Durg and Bastar.
nime, nim	nī-	Chandrapur and Adilabad.
nima	nī-	Khammam and Malkangiri.

2.2 The plural forms of the first and second person pronouns exhibit an even greater variety in shape and size than the corresponding singulars. Compare the forms given in (2) and (4).

(2) First person exclusive plural forms:

nom.	obl.	Geographical distribution
amaṭ	mā-	Sehore.
amaṭ, amaṛ	mā-	Betul, Chindwara, Balaghat, Amraoti, Akola, Wardha, Nagpur, Bhandara.
amak, amok	mā-	Sehore, Balaghat, and Yeotmal.
mamaṭ, mamaṛ	mā-	Northern Seoni, Mandla, North-western Bastar (plains).
mamoṭ, mamok	mā-	Adilabad.
mamoṭu, mamaṭu	mā-	Southern Chandrapur.
namaṭ, namoṭ	mā-	Northeast of Bastar, Eastern Adilabad and Chandrapur (Grierson 1906).
mamaṭ, mam	mā-	Northern Seoni, Western Mandla.
mama; mam	mā-	Southwest of Bastar.
mamo, mam, mom	mā-	Southeast of Bastar.
mama	mā-	Khammam and Malkangiri (Burrow and Bhattacharya 1960).
māṭ, māṛ	mā-	Northwest of Bastar (hills), and Northeast of Garhchiroli.

2.3 There are, in some dialects, two plural forms for the first person, represented by morphologically and semantically distinct sets,

viz. exclusive (of addressee) (excl.) as in (2) and inclusive (of addressee) (incl.) as in (3).

(3) First person inclusive plural forms:

apan, apon	apna-	Sehore, Hoshangabad, Chindwara, and Mandla
aplo	aplo-	Betul, Seoni, and Adilabad
	aple-	Nagpur, Yeotmal, and Akola
amahk, amok	ma-	Amraoti (Grierson 1906)
maraṭ	ma-	Adilabad
manaṛ	mana-	Southern Chandrapur
manal	mana-	Southern Bastar
managa	mana-	Khammam (Tyler 1969)
manag̣	mana-	Khammam (Kachineni 1979)

(4) Compare the second person plural forms:

imaṭ, imeṭ	mī-	Sehore, Hoshangabad, Betul, Chindwara, Seoni, Mandla, Balaghat, Bhandara, Yeotmal, Amraoti; Akola, and Nagpur (Grierson 1906).
imaṭ, umaṭ	mī-	Betul (Shahpur), Hoshangabad, and Balaghat (Waraseoni).
imahk, imak	mī-	Mandla (Ghugri).
mimaṭ, mimoṭ	mī-	Chandrapur.
mimeṭ	mī-	Southern Chandrapur and Adilabad (Boath).
nimaṭ, nimeṭ	mī-	Northern Bastar (plains), and Adilabad (Neville 1969).
miraṭ	mī-	Adilabad.
miraṛ	mī-	Bastar (Madia dialect (Grierson 1906)).
mīṭ̣, mīṙ	mī-	Northwestern Bastar (hills) and northeastern Garhchiroli.
mīṙ, mīr	mī-	Southeastern Bastar.
mīr	mī-	Southwestern Bastar, Khammam, and Malkangiri.

2.4 On the basis of phonological and morphological variation, these pronominal variants may be identified as belonging to one of the four sets, as summarized in (5).

- (5)
- Variants with an initial V(owel)-.
 - Variants with an initial n-.
 - Variants with an initial m-.
 - Variants with morphological restructuring.

2.5 The pronominal alternants in different combinations form the following ten major sets of personal pronouns as found in various dialects of Gondi. These sets disregard a great deal of variation, e.g. *uma*, *ime*, *mamoŋ*, *imeŋ*, etc. Each of these sets is a characteristic of a particular region though certain regions exhibit overlapping sets. Ten major dialect groups may be identified based on the sets given in (6). Also see (7) in which each dialect is listed against the characteristic pronominal set (cf. map 1).

(6)	1 sg.	I) <i>ana</i>	II) <i>nana</i>	III) <i>nana</i>	
	pl.	<i>amaT</i>	<i>amaT</i>	<i>mamaT</i>	
	2 sg.	<i>ima</i>	<i>ima</i>	<i>ima</i>	
	pl.	<i>imaT</i>	<i>imaT</i>	<i>imaT</i>	
		IV) <i>nana</i>	V) <i>nana</i>	VI) <i>nana</i>	III) <i>nana</i>
		<i>mamaT</i>	<i>mamaT</i>	<i>namaT</i>	<i>mamaT</i>
		<i>nima</i>	<i>nima</i>	<i>nima</i>	<i>nima</i>
		<i>nimaT</i>	<i>mimaT</i>	<i>nimaT</i>	<i>miraT</i>
		VIII) <i>nana</i>	IX) <i>nana</i>	X) <i>nana</i>	
		<i>māT</i>	<i>mama</i>	<i>mama</i>	
		<i>nima</i>	<i>nima</i>	<i>nima</i>	
		<i>mīT</i>	<i>mīŋ</i>	<i>mīr</i>	

I will use -T at the end of the plural forms as a short hand expression to indicate the plural suffix variants: -ŋ, -r, and -k.

(7)	set no.	dialect
	I	WG (Western Gondi)
	II	CG (Central Gondi)
	III	NG (Northern Gondi)
	IV	NBG (W) (Northwest Bastar Gondi)
	V	SG (Southern Gondi)
	VI	NBG (E) (Northeast Bastar Gondi)
	VII	AG (Adilabad Gondi)
	VIII	HMG (Hill Maria Gondi)
	IX	SBG (South Bastar Gondi)
	X	SEG (South Eastern Gondi)

3.0 Reconstruction:

To reconstruct the Proto-Gondi set of personal pronouns based on the data given in section 2.0 alone may be misleading because the variation noted among the personal pronouns of Gondi is also found, though, to a lesser extent in most of the languages of South-central Dravidian (ScDr.) of which Gondi is a member. However, as a test case I would first consider reconstructing personal pronouns for Proto-Gondi based on the data available within Gondi and then compare the

results with the reconstructions for other subgroups of Dravidian.

3.1 On the basis of the data drawn from Gondi, the following set of personal pronouns could be set up for Proto-Gondi:

	1 sg.	1 pl.	2 sg.	2 pl.
	ana	amaT	ima	imaT
	nana	namaT	nima	nimaT
		mamaT		mimaT
		mama		miraT
PG	*ana	*amaT	*ima	*imaT

Table 1

The above reconstruction is supported by the fact that neither Proto-Gondi nor any dialect of Modern Gondi have ever experienced loss of initial nasals.² The dialectal variants of second plural mīI (mīI, mīr and mīr of sets VIII, IX and X) and the first plural māI (māI and māI) are excluded from the reconstruction because they were considered either due to morphological restructuring and / or borrowing. Thus the reconstructed forms shown in table 1 may be considered as proto-set of the dialects representing the pronominal sets I-VII but not of Proto-Gondi.

3.2 A close look at the pronominal variants of the singular and plural forms reveals that many of the plurals carry an additional plural suffix which can be any one of the three variants: -t, -r and -k. However, this feature cannot be reconstructed for Proto-Gondi for the following reasons: 1) The plural suffix is not found in the dialects of SBG (set IX) and SEG (set X); 2) Even among the other dialects where it is commonly found, the plural suffix marker is not the same; 3) Occasionally, in some of these dialects (NG and AG see #2.2) the plural suffix may altogether be omitted.

However, it might be argued that, if a plural suffix is found in several dialects, it might be reconstructed for Proto-Gondi. In spite of its occurrence in a number of dialects, the absence of it in two dialects (SBG and SEG) covering a considerable region is conspicuous and should be accounted for. It will be evident from the following discussion that in fact the presence of morphologically restructured and borrowed forms in these dialects (which exhibit sets VIII, IX, and X) may be interpreted as a precursor of the plural suffixation experienced by the other dialects. All this evidently indicates that the formation of plurals by the addition of plural markers is not a pan-Gondi phenomenon and thus does not lend support for the reconstruction of this formation.

3.3 Therefore, a correction should be made in order to arrive at a reasonably safe proto-set of personal pronouns. The corrected prototype of the pronominal system is given in (8), along with the corresponding oblique bases:

(8)		nom.	obl.
	1 sg.	*ana	*nā-
	pl.	*ama	*mā-
	2 sg.	*ima	*nī-
	pl.	*ima	*mī-

3.4 Curiously, the second plural nominative is homonymous with the second singular nominative, whereas the corresponding oblique bases show overt differences. On the comparative evidence, the Proto-Gondi second singular may be related to pre-Gondi second plural **ima, (cf. second plural nominative in Ta. nīm, nīnkai; Ma. niññai; Ko. nim; To. nīm; Kod. ninga; Ka. nīm, nīvu, nīngai; Tu. nikulu, inkulu; Te. mimm- 'oblique base in accusative'; Kon. nīm; Kv. mimbu; Pe. ip(eŋ); Man. im; Nk. im; Pa., Ga. im; Kur., Malt. nīm; Br. num. (DEDR 3688) and Proto-Dravidian second plural nominative *im (Zvelebil 1962), *nīm (Krishnamurti 1968, Subrahmanyam 1968b, Zvelebil 1977), which presumably has replaced the pre-Gondi second singular **ina. Hence a prototype of pronominal system for pre-Gondi can be posited as shown in (9).

(9)		nom.	obl.
	1 sg.	**ana	**nā-
	pl.	**ama	**mā-
	2 sg.	**ina	**nī-
	pl.	**ima	**mī-

Compare the reconstructed form of pre-Gondi second singular **ina with that of the reconstructed form of Proto-Dravidian second singular *in (Zvelebil 1962), *nīn (Krishnamurti 1968, Subrahmanyam 1968b, Zvelebil 1977), and *(n)ī (Kuiper 1972:147); (cf. Ta., Ma., Ko., To. nī; Ka. nīn(u); Kod. nīnī, nī; Tu. ī; Te. nīvu, īvu; Kon. nīn; Ku. īnu (W), nīnu; Kv. nīnu; Pe. ēn; Man. in; Kol. nīv; Nk. nīv, īv; Pa., Ga. in; Kur., Malt. nīn; Br. nī (DEDR 3684).

3.5 The pre-Gondi pronominal set is regular, with the singular vs. plural distinction expressed by the opposition of medial n/m, while person is expressed by the a/i contrast. Proto-Gondi did not inherit the second singular **ina of pre-Gondi (see (8)), while the reconstructed second singular and plural forms for Proto-Gondi are homonymous (see (8)), that led to the expansion of the domain of *ima to cover second singular nominative as well (yet the distinction between the corresponding oblique bases is maintained). Presumably this should have rendered the Proto-Gondi pronominal set incoherent or asymmetric. (Incidentally, Modern English too, does not distinguish

between the second person singular and plural not only in the nominative but also in the oblique base, therefore not asymmetric.) Consequently the pronominal system must have been in a state of great instability that led to a number of innovations toward regularity which are reflected in the dialects of Modern Gondi.

4.0 Discussion:

To substantiate the above reconstruction, the immediate task will be to account for all divergent forms of pronouns found in the dialects of Modern Gondi, assuming the proto-type set as the source.

4.1 The structure and the distribution of the modern pronominal sets across the dialects suggest two different processes: (1) Innovation toward the restoration of the singular vs. plural distinction in the second person nominative by the addition of a plural suffix (as seen in ima : imaT, nima : nimaT); (2) Analogical spread of the initial nasals of oblique bases to the corresponding nominative forms (e.g. ima >> nima, *ama >> mama). (It may be mentioned here that the operation of any one of the two processes would restore the singular vs. plural distinction.) Further, the distribution of the personal pronouns across the dialects of Gondi indicates that the process of restoration of number distinction (by appending a plural suffix) started in the north-western dialects (sets I-VII) and moved down toward the south-eastern dialects (SEG and SBG represented by the sets X and IX), which it never reached, while the analogical extension of initial nasals first appeared in the dialects of the south-east and spread toward the north-west (see WG representing the set I is totally unaffected, whereas sets II and III are partially affected). The figure 1 is a diagrammatic illustration of the spread of these innovations:

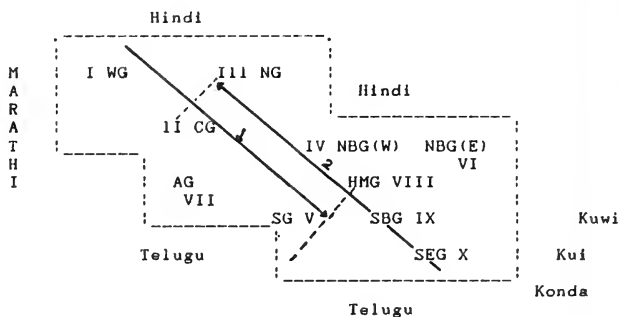


Fig. 1.

The above assumption is necessitated by the pronominal sets I (ana, amaI, ima, imaI), IX and X (nana, mama, nima, mir/mir), which do not show one or the other of the two innovations. In other words, some dialects must have started showing the analogical spread of the nasals even before the development of the singular vs. plural distinction, and in some other dialects the converse may be true. The dialects which exhibit the analogical spread of nasals prior to plural suffix affixation are geographically contiguous with Telugu and other South-central Dravidian languages (cf. map 1). Analogical extension of the nasals of the oblique bases to the nominative forms is an areal phenomenon found in Telugu, Konda, Kui, and Kuvi. In a similar fashion the dialects of Gondi (HMG, SBG and SEG) have borrowed mir from Telugu (see Subrahmanyam 1968) to replace the inherited homonymous second plural *ima. In addition to Gondi and Telugu, certain other languages of South-central Dravidian exhibit *mir(u) which according to Krishnamurti (1968:194) is an areal convergence among these languages.

4.2 Obviously the second plural forms of sets VIII, IX, and X (mīI, mīr and mīr) on one hand, and of sets IV and VI (nima, nimaI; possibly of VII, mimaI << *nimaI) on the other hand indicate that the spread of initial nasals of the corresponding oblique bases had not resulted in a singular vs. plural contrast. Presumably, dialects IV-X share this feature. Had the initial nasals n- and m- of second person oblique bases spread to the homonymous second person singular and plural nominative forms (*ima : *ima) there would have resulted forms like nima and mima corresponding to the first person singular and plural nominative forms nana and mama. However, the spread of n- both to the second singular and plural nominative forms, rather than the expected n- and m- of respective oblique bases as in the case of the first singular and plural pronouns, failed to restore the singular vs. plural distinction among the homonymous second person nominative forms. Consequently the asymmetry or the irregularity in the prototype system remained unchanged. At this stage, a number of innovations (see #4.3 A-G) toward the restoration of number distinction were carried over.

4.3 To conclude the foregoing discussion, I will posit the following changes to account for the divergence of the Proto-Gondi pronominal system from which is found in the dialects of Modern Gondi:

- (A) (i) Analogical spread of n- of the first singular oblique base to the corresponding nominative form as attested in sets II-X.

	nom. :	obl.	
1 sg. :	*ana :	*nā-	>> nana : nā-

- (A) (ii) Analogical spread of m- of the first plural oblique base to the corresponding nominative as attested in sets III-X.

nom. : obl.
1 pl. : *ama : *mā- >> mama : mā-

- (A) (iii) Analogical spread of n- of the second singular oblique base to the homonymous second singular and plural nominative forms. Attested in sets IV-X. (cf. (10))

(10) nom. : obl.
2 sg. : *ima : *nī- >> nima : nī-
pl. : *ima : *mī- >> nima : mī-

- (A) (iv) Replacement of m- of the nominative first plural by n- to generalize the initial n- for all nominative forms as attested in set VI (11) below:

(11) *nana nana
*mamaT >> namaT
*nima nima
*nimaT nimaT

- (A) (v) Replacement of n- of the nominative second plural form by m- to achieve regularity in the system. Attested in set V as in (12):

(12) *nana nana
*mamaT mamaT
*nima nima
*nimaT >> mimaT

- (B) Plural suffix affixation. Attested in sets I-VII (cf. (13)).

(13) *ama + T > amaT (sets I and II)
*mama + T > mamaT (sets III to VII)
*ima + T > imaT (sets I to III)
*nima + T > nimaT (sets IV to VII)

A number of nonlocal as opposed to local changes (as their effect is limited to pronominal system, e.g., innovations (A-B) have additionally contributed to the diversity of pronouns:

- (C) A regular change *r > r̥ is attested in a number of Modern Gondi dialects. Compare set IX: mīr̥ (<*mīr̥), as well as ōr̥ (<*ōr̥) 'they (masc.)', in the same dialect.

- (D) The plural suffix variant $-t$ freely varies with $-r$ in many dialects of Gondi, as in udat~udar 'sit (plural)!'.
 (E) A sporadic change like $a > o/m$ is known to have operated in many dialects of Gondi (cf. mom- 'to sell' (<*mam-)).
 (F) An unrounded back vowel /a/ in second syllable was either fronted or rounded by a preceding front or rounded vowel respectively as in sewar (<*sewar) 'gum, resin', sowwar (<*sowwar) 'salt'. This is historically older than rule (E).
 (G) Word-final vowels are optionally reduced or deleted in many of the present-day dialects, except in SEG. (cf. (14))

(14) nana~nan cf. marri~mar 'son'
 mama~mam maccu~mac 'dew'

4.4 Certain dialects exhibit pronominal variants which may be due to morphological restructuring. The second plural form miraṭ was the result of contamination of mimaṭ (which occurs as a regional variant minaṭ in AG (Boath), see (4) (cf. set V)) with mīr (but not due to the addition of the plural suffix $-aṭ$ to mīr which would have resulted in *mīraṭ, with a long vowel in the initial syllable).⁴ A parallel development is found in the first person plural inclusive marat of the same dialect, which is possibly derived from first person plural exclusive mamat on the analogy of miraṭ. Later, by functional polarization, marat was restricted to first person plural inclusive usage, beside earlier mamat which continued to be used as the first person plural exclusive pronoun.

In the dialect of HMG (set VIII) the earlier form mama was replaced with an analogically remodeled form māṭ after the second plural mīṭ (mīr < mīr).

5.0 What does comparative evidence indicate?

The reconstruction of personal pronouns for Proto-Gondi attempted in section 3 is entirely based on the data drawn from the dialects of Gondi. In this section I try to compare the reconstructed personal pronouns for Proto-Gondi with the reconstructed forms for various subgroups in Dravidian.³ Compare the first singular forms given in (15).

- (15) Go. ana, nana;
 SDr.: Ta. yān, nān; Ma. ñān; Ko. ān; To. ṣn; Ka. ān, nān;
 Kod. namI, nā;
 ScDr.: Te. ṣnu, nṣnu; Kon. nānu; Ku. ānu, nānu; Kv. nānu;
 Pe. ān(eg); Man. ān;
 CDr.: Kol., Nk., Pa., Ga. ān;
 NDr.: Kur., Malt. ṣn; Br. I (obl. (k)-an- (Emeneau).

The presence of n- forms of the first singular in the languages of South Dravidian and South-central Dravidian (Tamil, Malayalam, Kannada, Kodagu, Telugu, Konda, Kui, and Kuwi) suggests that the development of n-initial forms is not confined to Gondi, but goes back to Proto-South-South-central Dravidian. The Gondi first singular ana has its counterparts in every subgroup of Dravidian. Therefore both *ana and *nana may be reconstructed for Proto-Gondi.

5.1 Compare the following forms of first plural given in (16):

- (16) Go. amaT, mamaT, mam(a), namaT;
 SDR.: Ta. yām, yāṅkaḷ, nāṅkaḷ; Ma. ṅāṅṅaḷ; Ko. ām; To. ēm;
 Ka. ām, nām, nāvū; Kod. eṅga, naṅga;
 SCDr.: Te. ēmu, nēmu, mēmu; Kon. māp; Ku. māmu; Kv. māmbu;
 Pe. āp(eḡ); Man. ām;
 CDr.: Kol., Nk., Pa., Ga. ām;
 NDR.: Kur., Malt. ēm; Br. nan 'we' (< *nām 'we incl.'
 DEDR 3647).

The m-initial forms of the first plural otherwise are found not only in Gondi but also in the languages of South-central Dravidian (Telugu, Konda, Kui, and Kuwi), which warrant the reconstruction of the first plural exclusive *mam for Proto-South-central Dravidian. Cognates of n-initial forms are rather widespread among the languages of South Dravidian (Tamil, Malayalam, Kannada, and Kodagu), but in South-central Dravidian only in Telugu (besides Gondi) exhibits such forms. It is apparent from the distribution of first plural forms in each language, that none of the three variants i.e. vowel initial, n-initial, and m-initial forms are exclusive to Gondi.

5.2 According to Krishnamurti (1968), the Gondi first plural exclusive namaT is originally a cognate of Proto-Dravidian *nām (1 pl. incl.), which, however lost its distinctiveness as first plural inclusive and merged with the first plural exclusive in Modern Gondi. Compare the following forms given in (17) as cognates of *nām by Krishnamurti (1968:191) (Only selected forms are reproduced below.):

- (17) SDR.: Ta. nām, nāṅkaḷ; Ma. nām, nāṅṅaḷ; Kod. naṅga;
 Ka. nām; Tu. nama;
 ScDr.: Te. nēmu, mēmu, manamu; Go. namaṭ, mamaṭ, mama;
 Kon. māp; Ku. māmu; Kv. māmbu;
 CDr.: Kol. nēṅḍ; Nk. nēṅḍ, nēm;
 NDR.: Kur., Malt. nām; Br. nan.

None of the first plural inclusive variants found in the dialects of Gondi seems to be derived from the reconstructed Proto Dravidian first plural inclusive *nām. Of the four major dialectal variants of the first plural inclusive, apan with its minor variants is a loanword from Indo-Aryan and is mostly found in the northern

under section 3.2 that plural marking on Gondi personal pronouns cannot be reconstructed for Proto-Gondi.

The evidence presented above leads us to reconstruct the following personal pronouns for Proto-Gondi as in (19):

(19)	1 sg.	:	*ana, *nana
	pl. (excl.)	:	*ama, *mama, *nama
	2 sg.	:	*ima, *nima
	pl.	:	*ima, *nima, *mima

6.0 Conclusion:

In this paper, I have reconstructed personal pronouns for Proto-Gondi and then tried to compare these with the cognates (and also the reconstructed forms) of pronouns of various subgroups of Dravidian. I have argued using the relevant data from other Dravidian languages to justify that certain variants of personal pronouns found in various dialects of Gondi are not developments within Gondi but are inherited from an earlier common source. The latter method suggests that all the three major variants viz. vowel-initial, n-initial, and m-initial forms may be reconstructed for Proto-Gondi, whereas the reconstructed forms of personal pronouns using Gondi data suggest that all variants excepting vowel-initial forms are innovations within Gondi and thus cannot be reconstructed for Proto-Gondi.

What is important is that the 'external' evidence suggests that the dialect variation in Gondi is much older. The presence of nasal-initial forms only in those dialects of Gondi which are geographically contiguous with other South-central Dravidian languages is evidently an indication of areal diffusion or outside influence. The method which takes into consideration of only Gondi data predicts that the diffusion took place after the division of Gondi from its immediate sister languages, while the method which uses 'external' evidence assumes that the development of initial nasals antedates Gondi. However, the reconstruction by the latter method is justified by the occurrence of the phenomenon of vowel-initial and n-initial pairs in the languages of South-Dravidian group (ascribed to Proto-South-South-central Dravidian (cf. Krishnamurti 1976)). The development of m-initial forms of the first and second plural nominative was an innovation traceable to Proto-South-central Dravidian.

NOTES

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Gondi data are given in phonemic transcription. Vowel length in non-initial syllables is predictable, however, with a few exceptions which are irrelevant here: Vowels in non-initial syllables are long in the dialects representing the pronominal sets I-VIII. Word-final vowels are generally short, but long in checked final syllables in the dialects representing the pronominal sets IX and X. Consonants are geminated after short vowels in initial syllables in all dialects.

The reverse case of prothetic nasals is attested by such words as nēnd- (< *ēnd-) 'to dance' (DEDR 895), and mam-~mom- through the intermediary and attested forms vom-~om- (< *am-) 'to sell' (DEDR 186).

Krishnamurti (1976:139-153) subgroups the Dravidian languages as follows:

- South Dravidian I: Tamil (Ta.), Malayalam (Ma.), Kodagu (Kod.), Toda (To.), Kota (Ko.), Kannada (Ka.), and Tulu (Tu.);
- South Dravidian II: Telugu (Te.), Gondi (Go.), Konda (Kon.), Kui (Ku.), Kuvi (Kw.), Pengo (Pe.), and Manda (Man.);
- Central Dravidian: Kolami (Kol.), Naiki (Nk.), Parji (Pa.), and Gadaba (Ga.);
- North Dravidian: Kurukh (Kur.), Malto (Mal.), and Brahui (Br.).

According to him, one of the three clear isoglosses covering South Dravidian I and II is 'The analogical formation of *nān/*nan- 'I' from the PDr. inclusive plural *nām/*nam- 'we' in addition to the retention of PDr. *yān/*yan- 'I'...' In his later paper (1978:2) he renames South Dravidian II as South-central Dravidian, and South Dravidian I as South Dravidian.

Krishnamurti and Subrahmanyam (1968:203) suggest that mirat was derived from mīr+at followed by shortening of the vowel in the initial syllable. However, there is no proper evidence to such an assumption, see counter examples: sēl + aṭ --> /sēlaṭ/, [se:la.ṭ] 'sister', sūr + aṭ --> /sūrāṭ/, [su:ra.ṭ] 'see (pl.)!'.

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DEVANĀGARĪ WORD-PROCESSING ON THE IBM-PC¹

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This is an interim report on the development of a word-processor that makes the Devanāgarī alphabet available on the IBM-PC. This word-processor is particularly geared toward use of that writing system with the Sanskrit language. To that end, it incorporates the Sanskrit rules of sandhi within the word-processing framework. The word-processor is also aimed towards those coming to Sanskrit from an English-speaking background. The keyboard input is closely related to the common Romanized transcription of the Devanāgarī. The program also provides a basis for exercises to assist students in learning Devanāgarī characters and the rules of Sanskrit sandhi.

0. INTRODUCTION. The adaptation of the computer from its original setting (mathematics and engineering) to use by those in the humanities has been somewhat slow. For those working in languages and linguistics, it has been slower still. In the latter case, one of the main stumbling blocks has been the unavailability of characters (not to mention complete alphabets and syllabaries) beyond those generally in use for modern European languages (that is, beyond the Roman alphabet).

The Apple Macintosh was one of the first personal computers to provide the capability of multiple fonts that could be fairly easily designed for individual use. IBM, however, has provided a built-in set of only 255 characters, comprising the basic Roman alphabet along with a few letters with diacritics (primarily vowels with accents and umlauts). While this is adequate for English, French, German, and Spanish, it is unusable for languages written with other alphabets and even for some requiring just a few additional characters, such as, for example, Hungarian or Swedish. Both Apple and IBM, in addition, are equipped only with the traditional keyboard layout. Therefore, even if additional characters are available, there still remains the question of the relationship between the Roman alphabet keyboard and the additional or replacement characters. This is a particular difficulty for ideographic writing systems like Chinese.

It was to assist in this accommodation of computers to the humanities that I designed the Sanskrit word-processor which I will describe in this brief report. First I outline some of the difficulties faced in computerizing the Devanāgarī alphabet in a user-friendly way. Then I discuss briefly some other Devanāgarī word-processors. Finally, I describe the construction and use of both the font itself and the word-processing program.

1. PROBLEMS. Providing a font for the Devanāgarī writing system is not simply a matter of creating an alternate set of characters to replace the Roman alphabet generally found on personal computers. There are three major problems in implementing a Devanāgarī word-processor: (1) the large number of compound characters; (2) the context-dependent forms of each character; and (3) the non-linearity of the graphic symbols. In order to understand these difficulties a short introduction to the Devanāgarī writing system is in order.

Although probably related distantly to the Roman alphabet, the Devanāgarī writing system is in fact a combination of syllabary and alphabet. The basic unit of the writing system is called an akṣara. (This term will be used interchangeably with the word 'character'.) The writing system is alphabetic in that each consonant sound has a typical character shape (which is modified according to context). It is syllabic, however, in that the basic character shape for each consonant sound includes an 'inherent' schwa or a sound. Other following vowel sounds are indicated by other diacritics around the akṣara. To indicate that no vowel follows, a special diacritic (the virāma) must be placed under the akṣara. (Vowels have their own character shape when they appear initially or in isolation.)

The basic set of akṣaras, then, consists of the symbols for single consonant sounds. These are modified by various diacritics to produce the representations for the 11 basic open syllables beginning with that sound. Thus we have in (1) the character for the s sound combined with the 11 vowel sounds. (r is a vocalic r).

(1) स सा सि सी सु सू से सै सो सौ स् स्
sa sā si sī su sū se sai so sau sr s

The implications of the 'inherent' a sound in each akṣara for the representation of consonant clusters is that a cluster cannot simply be written by juxtaposing the basic akṣaras, since this would be read with an intervening a sound. Instead, to indicate the cluster, the two symbols must in some way be conflated. Thus, for example, we see below the Devanāgarī equivalents of sa, ta, sata, and sta.

(2) स त सत स्त

Thus, the writing system is syllabic also in the fact that each consonant cluster is represented by a separate akṣara. It would, of course, be possible to use the virāma to write "sta" as in (3) or even as in (4). But this is not the normal way in which the syllabary is used and would be regarded as highly unusual and a violation of the basic principles of the writing system.

(3) स्त

(4) स्त्अ

There is some degree of regularity in the formation of compound akṣaras. Often the consonants are conjoined left-to-right or top-to-bottom. Below we see an example of each type of conjoining.

(5) स म स्म ष ठ ष्ठ
sa ma sma ṣa ṭha ṣṭha

In a number of cases, however, there is a special combination form for the character, seemingly unrelated to the basic form. And, there are some forms which simply must be memorized. Occasionally, too, more than one way is available to write a compound character. Compare the examples in (6).

(6) र प्र म्र ज ञ्ज्ञ
ra pra mra ja ṅa ṅña

It should be pointed out that the Devanāgarī writing system is not syllabic in the phonological sense. An akṣara consists, with few exceptions, of a series of initial consonants followed by a vowel. Thus, the akṣaras of the Devanāgarī syllabary do not correspond to the syllables of the Sanskrit language, or really of any other language. As with most languages, Sanskrit has both open and closed syllables. Thus, for example,

the Sanskrit phrase which consists of the sequence of words in (7) would be syllabified as in (8) and written as the set of akṣaras in (9).

(7) kṣetreṣu siktābhīr meghānām adbhīr dhānyam prarūḍham
by the water which drops from the clouds upon the fields the grain grows
tall

(8) kṣet re ṣu sik t ā bhīr me ghā n ā ma dbhī rdhān yam pra rū ḍham

(9) क्षे त्रे षु सि त्ता भि र्मे घा ना म द्धि र्धी न्यं प्र रू ढ म्
kṣe tre ṣu si kt ā bhī rme ghā n ā ma dbhī rdhā nyam pra rū ḍha m

As can be seen, this style of writing for the most part ignores word boundaries. The consonant ending a word is combined with the initial character of the following word to create a compound character (if it is a consonant), or the following vowel is placed as a diacritic on the preceding consonant. A space in the string of akṣaras generally occurs only when a word boundary and an akṣara boundary correspond. All akṣaras hang down from a base-line which carries completely through the line of writing, broken only as indicated above, or where there is a mark of punctuation. There are also a few characters which require breaking the base-line.

This connection across word boundaries poses some difficulties for the basic word-processing tasks of inserting, deleting, and moving words or other segments of text. That is, the graphic shape of the word to be inserted, for example, will vary depending on the characters immediately to the left and right of the insertion point. These characters are also subject to graphemic variation. A user-friendly word-processor should handle these variations automatically, instead of requiring the user to manually alter the character shapes. These tasks are made doubly difficult when working with Sanskrit. The Sanskrit language has an extensive set of rules of sandhi which apply across word boundaries. These consist primarily of rules of assimilation and vowel coalescence. Unfortunately, the result of these rules is not simply expressed in speech but is reflected also in the written forms. Thus, for example, a word final *a* combines with a following initial *l* to produce an *e*. To show the difficulties of simply altering word order, the two words, *fire* and *here*, shown in their isolation forms in (10) would appear as (11) in one order and as (12) with reversed order.

(10) अग्निस् अत्र
agnis atra

(11) अग्निरत्र
agniratra

(12) अत्राग्निः
atrāgnih

There are a few additional complications to the Devanāgarī alphabet.

(a) It is not completely linear. As we have seen in examples (5) and (6), certain of the compound characters are not linearly oriented. But beyond this, *l* is written before the consonant cluster after which it is pronounced. Thus, for example, *stl* would be written as in (13).

(13) स्ति
i-s-t

In addition, a cluster-initial *r* is written as a hook, placed at the very end of the akṣara which it precedes. Thus, *kārtsnya*, 'entirety', would be written as in (14).

(14) कारत्स्यं

k-ā-tsnyr-

(b) There are some exceptions, as mentioned above, to the rule that each akṣara represents an open syllable. First, a word-final nasal consonant is written as a small dot above the previous akṣara (*anusvāra*). Thus, "kam" would be written as follows:

(15) कं

Also there are certain consonant clusters which cannot be written as a compound akṣara (generally due to the difficulty of combining the consonant shapes). In such a situation, the consonant cluster is written as a sequence of two simpler akṣaras, the first ending with the *virāma* (in order to eliminate the inherent vowel). Such is the case for "ṭṣ" as in "liṭṣu" in (16).

(16) लिट्‌सु

(c) The Devanāgarī writing system is almost inherently proportionally-spaced. Although the "ideal" is for each akṣara to take up the same amount of space, lengthy consonant clusters will require more room than single characters. This has repercussions even for such seemingly compositional constructions as diacritic placement. Diacritics placed under an akṣara should appear under the middle of that akṣara. With characters of varying width, the placement of the diacritic is not exactly the same. The font used for the examples here has two versions of most diacritics. The user must guess which version should be used with which characters. (17) demonstrates the difference.

(17) से से सु सु सू सू सै सै

In conclusion, the Devanāgarī writing system, as in most things connected with human language, is a complex combination of predictable generalizations and idiosyncratic singularities. The particular difficulties that this writing system raises for the construction of a word-processor are (1) how to deal with the large number of (compound) characters in terms of storage, presentation, and keyboard arrangement; and (2) how to deal with the context-dependent forms of the characters (conflation and rules of sandhi across word-boundaries). In the next section, some earlier approaches to these problems are described. Then the solution chosen here is outlined.

2. SOLUTIONS. The earliest versions of a Devanāgarī word-processor were created for Macintosh PCs. They required the user to construct the characters as they were needed. The font provided all the "parts" of the characters (about 100) that were necessary to create all the akṣaras of the Devanāgarī system. Most consonants existed in both a solitary and a combination form. Certain (but not all) compound characters had special key-presses. Often two or more versions of the diacritics existed, in order to allow for variable placement around the consonants. It can be readily imagined that this type of keyboard arrangement is not particularly easy to learn or to work with. First, there is the large number of character parts that must be associated with the correct key-press. Then there is the difficulty of knowing whether or not there is a special character available or whether it must be constructed piece by piece. Finally, the problems of cutting and pasting are quite difficult. If you want to insert a word, it is often necessary to retype the adjacent words as well, simply to get the correct compound characters, as was seen in examples (10)-(12). This type of word-processor is now available for IBM PCs, though only with the use of a Hercules card.

There are now somewhat more sophisticated versions available which provide a limited amount of context-sensitive processing. For example, using the UBC Devanāgarī font (an unsophisticated processing program for the Macintosh) to type Sanskrit *su*, you must type *s* followed by *u*. To type Sanskrit *stu*, however, you must press *Option-s* (to obtain the compound form of *s*) then *t* and then *u*. This is illustrated in example (18). Later versions would determine whether the key-press following the *s* represented a consonant or a vowel and place on the screen the appropriate form of the *s* akṣara.

(18) Result: स॒ र॒ त॒
 KeyPress: s u Option-s t u

The first word-processors for the IBM-PC sidestepped entirely the issue of screen display and concentrated on providing printing capabilities for Devanāgarī characters. These programs created print-characters and associated them with particular key-presses. On screen, only ordinary ASCII characters were visible, but the file, when printed, resulted in Devanāgarī characters. Thus what appeared on the screen had no correlation to what appeared on the printed page. Proofreading and correcting with such a program is time-consuming.

The present proposal attempts to provide a more sophisticated interface between keyboard and screen display. For this purpose, the standard Roman transcription for Sanskrit/Devanāgarī was adopted as a basis. It was slightly modified so that only single strokes corresponded to single characters. Sanskrit has a vocalic system of 9 vowels, a | u r | (short), and ā ī ū ṛ (long). There are also four diphthongs: e o (short), ai au (long). Consonants occur in five series, corresponding to guttural, palatal, lingual, dental, and labial points of articulation. Each series has five members, consisting of a voiceless and a voiced stop (each with an unspirated and an aspirated version) and a nasal. There are also four semi-vowels, three sibilants, and an "h". Retroflex consonants are indicated by a dot beneath the corresponding dental consonant and aspiration is indicated by a following *h*. In almost all cases, then, it was possible to assign a Sanskrit phoneme to a single Roman character. Length in vowels was indicated by capitalization, as was aspiration. Retroflexion was generally indicated by the *Control*-key. In the few cases where additional assignments were necessary the *Alt*-key was used. The next example shows the standard transliteration and the key-press assigned by the word-processor.

(19) Transcription	Key-Press	Transcription	Key-Press
a	a	e	e
ā	A	ai	E
i	i	o	o
ī	I	au	O
u	u	r	R
ū	U	ṛ	Ctrl-r
!	L		
h	H		
k	k	kh	K
g	g	gh	G
n	Ctrl-g		
c	c	ch	C
j	J	jh	J

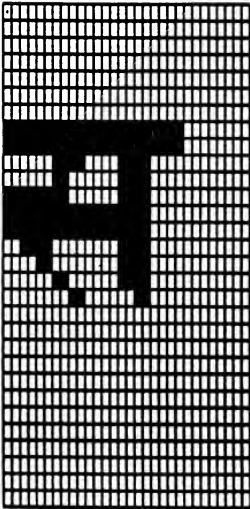
ñ	N		
t	Ctrl-t	th	Alt-t
d	Ctrl-d	dh	Alt-d
n	Ctrl-n		
t	t	th	T
d	d	dh	D
n	n		
p	p	ph	P
b	b	bh	B
m	m		
y	y	r	r
l	l	v	v
ś	S	ṣ	Ctrl-S
s	s	h	h

It is not entirely clear that this is the best possible key-press assignments. It might be better to avoid the Control and Alt keys, which are idiosyncratic to IBM and IBM-clone keyboards in favor of keys that are on all regular keyboards. There are a number of letters that are not put to use in this system of assignments: x, z, q, w, for instance. The one above would serve even better if Shift-Control would be aspirated retroflex consonants, such as th and dh, or long retroflex vowels, such as ṛ.

In any case, once a key-assignment is made, the Sanskrit is typed in word by word, leaving a space between words. As each key is pressed, the akṣara corresponding to that key appears. If the subsequent key-press creates a compound akṣara, the one on the screen is erased and the new one replaces it. This is accomplished by means of a TurboPASCAL program, which collects all the key-presses and evaluates the character to be printed. Thus, if one types in the sequence of characters, s-t-u, the following will appear on the screen (in the same location):

(20) स्
स्त्
स्तु

These characters are formed in two stages. Using a font-editor (see figure 1 for a screen dump of the font editor) the parts of characters needed to create all the compound akṣaras are created and saved as bit patterns. This parallels the earlier word-processors in which these character-parts were associated directly with key-presses. However, in this case, the character-parts have been pre-assembled into complete characters, or rather the instructions for creating the complete characters have been stored in a file. The TurboPASCAL program then associates each sequence of legitimate key-presses with the record in the file that has stored the instructions for the appropriate character. Then the character is placed on the screen. Figure 2 shows a direct screen dump of the basic Devanāgarī akṣaras as they would appear on the screen of the word-processor.² It is the number of these character records that are stored as the word-processing file. The width of each character is also stored so that the cursor can be moved appropriately. Thus, for example, if the screen showed the Sanskrit word



Cursor pad to move
 Ins -to turn on
 Del -to turn off

C - choose character
 M - save to memory
 S - save to disk
 L - load a character
 W - wipe grid clean
 P - print characters
 T - test word processor
 Alt-F1 - quit

EDITING: No. 1



Figure 1

अ इ उ ऋ लृ ए ओ
 आ ई ऊ ऋ ऐ औ
 क ख ग घ ङ
 च छ ज झ ञ
 ट ठ ड ढ ण
 त थ द ध न
 प फ ब भ म
 य र ल व श ष स ह

Figure 2

In (21), then the file containing that word might have only the numbers 365, 355, 282 representing the records in the character file that contain the instructions for creating the three akṣaras in the text.

(21) यमुना

Yamuna

At this stage, note that nothing has been done about word-boundary phenomena. The space between words prevents the PASCAL program from combining two consonants on either side. Nor has any sandhi been performed. The user, in fact, must type in the underlying form of the word, regardless of what appears to the left or right. However, whenever the cursor leaves a line, that line is replaced on the screen by a revised line. Using another TurboPASCAL program, the characters are re-evaluated on either side of a word-boundary (space). If they can be combined into a compound character, that single character replaces the original two and the intervening space. If the two characters are subject to sandhi, the correct sandhi form replaces them. For example, here is a line of Sanskrit as it would be typed in by the user (the second line is the list of key presses and the third is the normal transcription):

(22) आसीत् राजा नलस् नाम वीरसेनसुतस् बली

AsIt rAJA nAlas nAma vIrasenasutas baII
āsit rājā nālas nāma vīrasenasutas baII

When the line is complete, and the user goes on to the next, the following appears:

(23) आसीद्ब्रजा नलो नाम वीरसेनसुतो बली

āsItṛbṛjā nalo nāma vīrasenasuto baII

Of course, there are situations where one might want to block the application of this process (there are certain exceptions to the rules of sandhi). In such cases, a special (invisible) character inserted will block the application of this program. Also, it is possible (for instance, if one is copying previously prepared text), that one may want to type in the sandhied form. This, too, is possible, though the program is not capable of reversing the rules of sandhi and creating the original line. Correctly undoing sandhi is not generally possible unless you know enough Sanskrit to understand it. The function from underlying form to sandhi form is many-to-one. For example, the sandhi form in (24) can be resolved as either (25) or (26). Probably an on-line dictionary would permit one to undo most sandhi. However, even this word-processor is not that brilliant.

(24) एकोना

ekonā

(25) एकः ना

ekaḥ nā
'one man'

(26) एक उना

eka unā
'one less'

It is easy to see that in the present word-processing program the normal cut-and-paste operations of word-processing are much simpler. Words can be deleted, inserted, or moved as in most standard English-language word-processors. The adjustments that need to be made in the text on either side of the insertion or deletion are handled automatically by the word-processor. For example, in (27)-(30), the

user would initially type in at the key-board the second line of (27), while the first line of (27) would appear on the screen. Upon leaving that line of text, the screen display would change to that shown in (28). To change the word order, the user simply returns the cursor to the line, whereupon the screen display for that line would return to that shown in (27). Following the usual word-processing procedures, the second word is cut from its current position and then pasted in front of the remaining word as in (29). When the cursor leaves the line, then display then shifts to that of (30).

- (27) अग्निस् अत्र
 agnis atra
- (28) अग्निरत्र
 agniratra
- (29) अत्र अग्निस्
 atra agnis
- (30) अत्राग्निः
 atrāgnih

3. INSTRUCTIONAL USE. The programs that support the operation of the word processor can also be used to teach beginning students of Sanskrit. The two major programs are, as discussed above, (1) the program which relates the standard Roman transcription to the screen presentation of the appropriate Devanāgarī characters and (2) the program which performs the rules of sandhi, given a line of Sanskrit text. By simply extracting these two PASCAL programs, various sets of exercises can be easily created.

These exercises can be used to help teach the novice student several basic skills in learning Sanskrit. The first program (constructing the characters) is useful in teaching the Roman transcription system. By practicing associating strings of key-presses with Sanskrit characters, the student will learn to recognize and produce both simple and complex akṣaras.

The second program is useful in learning the rules of sandhi. The student can learn to perform sandhi appropriately and also to "undo" sandhi and recognize the underlying forms.

4. CONCLUSION. Currently the word-processor is not yet ready for practical use. All of the character-parts are available, and all of the basic akṣaras have been programmed. However, not all the compound akṣaras are yet available. This means that the secondary program which performs sandhi is not yet complete. Finally, many of the word-processing functions are not yet functional. Work should, however, be completed by the end of 1987.

In conclusion, the work on this word-processor shows some of the difficulties associated with making computer tools accessible and useful for students in the humanities, particularly language and linguistics.

NOTES

¹I would particularly like to thank Hans Henrich Hock for his assistance in thinking through the basis for this word-processing program. I would also like to thank Atsushi Fukada for his help with the PASCAL programming. The Language Learning Laboratory at the University of Illinois has been gracious in allowing me time and equipment to do the programming.

²Due to the requirements of this journal (namely that the final document be printed on a laser printer) and to the fact that the word processor is not intended to produce output that can be printed by the laser printers available, it is not possible to show actual output from the word-processor. A dot-matrix printout would look somewhat smoother than the figures shown. The other Sanskrit printouts in this paper were produced on a Macintosh, using an early version of Ashok Ahluwkar's U.B.C. Devanāgarī font. For the transliterations, diacritics of Hans Henrich Hock's Geneva-based Lingam font were employed.

POGULI SYNTAX IN THE LIGHT OF KASHMIRI:
A PRELIMINARY REPORT*

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The syntax of Poguli, an Indo-Aryan language spoken in the mountains just south of the Kashmir valley, is examined with special attention to the features that distinguish Kashmiri from most of the Indic family. Although Poguli does not have the anti-absolutive of Kashmiri, it still disallows dative case for personal and other [+human] direct objects in ergative tenses, distinguishes direct from inverse transpositions, and has a system of pronominal suffixes even more complex than that of Kashmiri. Having both verb-final and V-2 dialects, Poguli is a promising target for further field-work.

Poguli is an Indo-Aryan language spoken in the district of Doda in Jammu and Kashmir state. It is spoken in several dialects whose speakers, numbering from ten to twenty thousand, live in the area known as Pogul-Paristan in the mountains to the east and north of the town of Ramsu on the National Highway that runs from Jammu via Banihal to Srinagar. Poguli has no written tradition and no published literature other than some folk songs printed locally. After the early sketches published in Bailey (1908) and Grierson (1919), it has received little attention from linguists.¹

Poguli is of special interest because of its close relation to Kashmiri (some consider it to be a dialect of the latter; see Koul and Schmidt 1984:l0ff). As Kashmiri is typologically aberrant from the rest of Indo-Aryan, the study of adjacent neighbors, eg. Poguli, Siraji, Zundhari (Grierson's Rambani?), Khashali, Bhadrawahi, etc., promises to shed light on the sequence of events in the history of Kashmiri which led to its striking divergence from the rest of Indo-Aryan. While the data presented here, collected during a brief trip to Pogul, should be considered preliminary in nature, it does provide a new perspective on Kashmiri's typology and suggest not only answers but also questions that we may profitably ask about the history of northern Indo-Aryan languages.

I. Word Order. All informants with one exception used the modified SOV word order that is typical of Pakistan and northern India. In this word order type, non-

sentential objects precede the verb (1) while sentential objects (and some other subordinate clauses) follow the verb they are dependent on (2):

- (1) mi ciThi da-I leyU²
 me-DT letter give-CP pour-IMP³
 'Give me the letter.'
- (2) aaU bi go-s ki ti t&s ciThi da-I
 I-NM fear went that you-ER him letter give-CP
 l&
 poured
 'I was afraid you might have given him the letter.'

The exception was a non-native from Sialkot, a zamindar who used Poguli in speaking to workers on his lands. His Poguli had the V-2 order typical of Kashmiri (as well as a more Kashmiri-like phonology):⁴

- (3) aaU pyeen-mi-s tu tyeer
 I-NM send-1sF-2sAC you-NM there
 'I will send you there.'

II. Pronominal suffixes. Poguli has a system of pronominal suffixes that is more complex than Kashmiri's on the following counts: (A) Poguli has four series; cf (4). Kashmiri has three; cf (5). (B) Poguli has a suffix for every person-number combination; Kashmiri lacks one for the first person plural. (C) Poguli distinguishes gender in its pronominal suffixing system; Kashmiri does not.

(4) Absolutive. Ergative. Accusative. Dative.

1sm	-us	-m	N.A. ⁵	-m
1sf	-is	-m	N.A.	-m
2sm	-us	-t	-s	-t
2sf	-is	-t	-s	-t
3sm	-u	-ni	-n	-s
3sf	-i	-nyE	-n	-sa:
lp	-asam	-n	N.A.	-n
2p	-ath	-u/-v	-u/-v	-u/-v
3pm	-ua:	-ne	-nan	-nan
3pf	-ia	-nye	-ny&n	-ny&n

(5) Absolutive. Anti-absolutive. Dative.

1s	-s	-m	-m
2s	-kh	-th	-y
3s	-n (or -θ)	-n	-s
lp	-	-	-
2p	-v(i)	-v(i)	-v(i) ⁶
3p	-kh (or -θ)	-kh	-kh

In a form of gender agreement that is not easily accommodated on the Poguli chart, the accusative suffixes are accompanied by a vowel alternation in the preceding stem. For example, the stem of le 'pour; throw' is l& if the direct object is masculine (6) and le if feminine (7):

- (6) y& biit aahàti ki ter tAA aaU tu teru
 she fear was that then by I-NM you-NM there
 mAA pen-i l&-mi-s
 not send-CP pour-lsF-2sAC
 'She was afraid I might send you (m) there by
 then.'
- (7) y& biit aahàti ki ter tAA aaU tu teri mAA peni
 lemis
 'She was afraid I might send you (f) there by
 then.'

In addition, like Gujarati, Bhitrauti and other NIA languages far to the south⁷, Poguli shows gender and number agreement of adverbs with the direct object (note teru (ms) 'there' in (6) and teri (fs) in (7)). However, in contrast to what we find in Gujarati and its neighbors, such agreement seems to be possible only if the direct object is in the nominative case. If the direct object is in the dative, the adverb assumes the default masculine singular form (teru in (8)):

- (8) y& biit aahàti ki ter tAA tus as-an
 she fear was that then by you-NMmp us-DT
 ter-u mAA pen-i leu-th
 there-ms not send-CP pour-2pAB
 'She was afraid that you might send us there
 by then.'

Comparison with Kashmiri shows that Poguli has four sets of pronominal suffixes (to Kashmiri's three) because in Kashmiri the functions of Poguli's ergative and accusative sets are combined in a single "anti-absolutive" set.⁸

III. Inverse transitions. Although Poguli does not have the anti-absolutive, it does maintain the distinction of direct versus inverse transitions found in Kashmiri (cf. Hook and Kaul, ms.). In direct transitions a first person subject acts on a second or third person direct object or a second person subject acts on a third person direct object. In these situations the direct object is in the nominative case and the finite verb has an accusative suffix showing the person, number (and gender; see section II above) of the direct object. All other distributions of animate persons into subject and direct object positions are inverse. In them the direct object gets the dative case and the verb is (optionally) marked with a dative suffix showing only the person and number

(and, for third persons, gender) of the direct object (the subject must be third person if this optional dative suffix is to occur). Compare (9) and (10):

- (9) aaU tu teri pen-i le-mi-s
I-NM you-NM there-fs send-CP pour-1sF-2sAC
'I will send you there.' (direct transition)
- (10) saa ti teru pen-i lev-i -(t)
she you-DT there-ms send-CP pour-3s-2sDT
'She will send you there.' (inverse transition)

As in Kashmiri (Hook 1985), for some Poguli speakers the direct object of a dependent infinitive can be passed up (or "climb"; see Napoli 1981) to the finite form of the matrix verb, even if the matrix is intransitive:

- (11) aaU tu baal-nyi e-mi-s
I you-NM see-INF come-1sF-2sAC
'I will come to see you.' (direct transition)

IV. "Absolutive absolute". As first noted by Varma (1938:45), in Kashmiri, Shina, Bhadrawahi, Khashali and a few other northern Indo-Aryan languages, direct objects in ergative tenses must get the nominative case, even if they are first or second persons. Contrast Poguli (12) and Kashmiri (13) with Marathi (14) and Hindi (15):

- (12) yiis ti aaU teru pen-t-us
yesterday you-ER I-NM there send-P-1sAB
- (13) raath suuzu-th -as bi tsye toor
yesterday sent-2sAA-1sAB I-NM you-ER there
- (14) kaal tu ma-laa tikaDa paaThavi-l-a-s
yesterday you-ER me-DT there send-P-n-2sER
- (15) kal tuu-ne mujh-ko vahAA bhej-aa
yesterday you-ER me-DT there send-PST
'Yesterday you sent me there.'

The inadmissibility of the dative case for direct objects in ergative tenses is a major syntactic isogloss that now separates the Indo-Aryan languages of the northwestern mountains from those of the rest of South Asia.

V. Co-occurrence of pronominal suffixes. In Poguli there are restrictions on which sets of suffixes may co-occur with which. For instance, accusative suffixes cannot occur with dative suffixes. Attested combinations include: 1. Ergative (first and second person) with dative (all persons); cf. (16). 2. Absolutive with dative; cf. (17). 3. Ergative with absolutive; cf. (18):

- (16) baalTi mAA pAAI le-i lo chu-m-(i)saa
bucket in water pour-CP poured is-1sER-3sDTf
'I have poured water in the bucket for her.'

- (17) teni aaU aan-t-us -nan -e
 he-ER I-NM bring-P-1sAB-3pDT-PRF?
 'He has brought me for them.'
- (18) ti aaU aan -t-u -t -(u)s-e t&s& kice
 you I-NM bring-P-ms-2sER-1sAB-PRF? her-DT sake
 'You have brought me for her sake.'

The range of permitted combinations seems not to be so rich as in Kashmiri, where, for example, sequences of three suffixes may occur:

- (19) bi suuzu-n -as -ay
 I-NM sent-3sAA-1sAB-2sDT
 'He sent me to you (or for your sake).'
- (Kashmiri AA corresponds here to Poguli ER)

Furthermore, in contrast to Kashmiri, the order of ergative and absolutive suffixes is not fixed.⁹ Normally the absolutive suffix precedes the ergative (This is the opposite of the Kashmiri order):

- (20) ti aaU aan(u)-t-us -it 'You brought me.'
 you I-NM bring -P-1sAB-2sER (Poguli)
- (21) tsye on(u)-th -as bi 'You brought me.'
 you brought-2sAA-1sAB I-NM (Kashmiri)
 (Kashmiri AA corresponds here to Poguli ER)

The order seen in (18) (ergative suffix before absolutive), a marked order in Poguli, expresses the speaker's annoyance. Given this and the fact that the Kashmiri order at times forces discontinuity in the registering of the direct object's gender and number and its person (the form on(u) in (21) agrees with the direct object in gender and number (masculine singular) while the suffix -as marks it as the first person), it is probable that Poguli preserves the original order and that Kashmiri has innovated. A consequence of this innovation (in Kashmiri) is that since the first suffix now has to be subject; and the second suffix, direct object (in all tenses and no matter what the shape of the suffix); the accusative and the ergative suffixes could merge into a single set (the "anti-absolutive") without creating ambiguity. (It is also possible that the merger occurred first, and had as a consequence the fixing of the order "subject first, direct object second" as the order for Kashmiri suffixes in all tenses.) Perhaps a relic of such a putative earlier order is to be seen in the double marking of the direct object before and after the subject suffix that is occasionally found in the Kashmiri present perfect:

- (22) bi chu -s -(a)n -as -ay suuz-mut
 I-NM is-1sAB-2sAA-1sAB-2sDT sent-PP
 'She has sent me to you.'

VI. Conclusions. The Poguli data show that the distinction between direct and inverse transitions does not depend on the presence of anti-absolutivity. Since data from Pashto (Hook 1985) show that anti-absolutivity does not depend on the distinction of direct and inverse transitions either, we may conclude that these two features, although both present in Kashmiri, are not typologically linked. Poguli data provides further support for the linking of the presence of absolutive pronominal suffixes with the absence of dative marking of the personal direct object pronouns in ergative tenses in Indo-Aryan. (There is corroborating evidence for this typological link from Old Marathi where the second person singular suffix -si was used absolutely with the coreferential object pronoun put in the nominative. In modern Marathi -s is used agentially while second person direct objects must be put in the dative case.)¹⁰

Detailed investigation and comparison of the pronominal suffixing systems in Poguli, Kashmiri, and neighboring languages promises a solution to some of the questions that we are just beginning to formulate about the origin and development of this characteristic feature of northwest Indo-Aryan languages.

Postscript. Protected somewhat by their relative inaccessibility, mountain valley languages like Poguli have been able to preserve their particular characteristics even though spoken by very small numbers of people. Fifty years ago in a neighboring mountain area Siddheshwar Varma discovered and described languages and dialects spoken in as few as five households. Now, however, the relative inaccessibility of places like Pogul-Paristan is fast disappearing. A "Matadorable" road has been opened into the valley from Makarkot (on the National Highway) to Ukherhal. Last summer a Tourist Bungalow, complete with caukidar and kitchen, was set to open at Batroo and another one, further up the valley, is under construction for the pleasure of skiers and hikers. We cannot expect the coming generations in the area to go on maintaining it as a living museum of languages. It is much easier to do field work there now than in Grierson's time. But this very ease of access puts the information preserved in "lesser" languages at greater risk. There is much to be done and little time left to do it.

NOTES

* The research reported on here was carried out in July, 1985 during a summer of fieldwork primarily devoted to research on Kashmiri syntax. I am grateful to the American Institute of Indian Studies for its continued support and to the residents of Poguli who gave freely of

their time and hospitality, particularly to Mr. Rashpal Singh of Iniyard and Mr. Milap Singh of Koonchigam, and to their families and friends.

¹Recently Ruth Schmidt and Vijay Kaul have begun to examine the phonology of Poguli as part of an historical-comparative study of northern Indo-Aryan languages.

²The transcription used here (which I cannot claim to be phonemic) is similar to that found in many descriptions of New Indo-Aryan languages except that I use doubling rather than macron or colon to show vocalic length and caps to show nasal vowels. The symbol ɛ denotes a front vowel more open than e. In Poguli open vowels following /h/ have noticeably lower tone: see sentences (6-8). I have marked this with a grave accent. The phonetic value of i and e when used for Poguli (and other Indic languages cited in this paper) differs markedly from i and e when used to represent Kashmiri (see note 6).

³Abbreviations used in this paper include:

AA.....anti-absolutive	IMP.....imperative
AB.....absolutive	m.....masculine
AC.....accusative	n.....neuter
CP..conjunctive participle	NM.....nominative
DT.....dative	p.....plural
ER.....ergative	PP.....past participle
F.....future	PRF.....perfect
f.....feminine	P(ST).....past

⁴In particular his /ee/ showed a noticeable centering glide and strongly palatalized preceding consonants. This individual lived in Banihal town, some distance to the north of the Ukherhal-Makarkot area where most of the data reported here were collected.

⁵N.A. ('not applicable') because accusative suffixes occur only in direct transitions and first person direct objects are excluded from them by definition. See section III, 'Inverse transitions'.

⁶The transcription used here for Kashmiri is the one developed by Kenneth Hill in his classes in linguistic field methods at the University of Michigan in 1984. It is a phonemic transcription in which palatalization of consonants is indicated by /y/, retroflexion of apical stops by upper case T and D, and nasality in vowels by capitalization. Single /e/ is a central mid vowel unless it is preceded by /y/ and followed by a word boundary or palatal(ized) consonant. Then it is fronted. The vowel /ee/ is long central mid except when fronted by a preceding and a following /y/. The vowels /i/ and /ii/ are high central unrounded except when fronted by a preceding /y/.

The long vowels /oo/ and /uu/, the front allophone of /ee/, and the non-front allophone of /ii/ have a noticeable glide toward mid-central position. Only the front allophones of /i/ and /ii/ may follow the palatal fricative /S/ and the palatal affricates /c/, /ch/, and /j/.

⁷In Godwari, Bhitrauti and other languages of south-east Rajasthan, an adverb agreeing in gender and number with the direct object (and with the subject when there is no direct object) is used to express perfective aspect. See Hook 1982 and Hook and Chauhan 1986.

⁸Briefly stated, Kashmiri uses the same set of suffixes for subjects in ergative tenses that it uses for direct objects in non-ergative tenses. For examples:

- (a) yeyi muraadi kheetri tsye sooz-oo-th-as bi
 which purpose for you-ER send-PST-2sAA-1sAB I-NM
 'The purpose for which you sent me...' (G 790)
- (b) bi kar-inaav-ath tas saahyibas siity mulaakath
 I do-CAUSE-2sAA that gentleman with introduction
 'Shall I introduce you to that gentleman?' (G 985)

In (a) the suffix -th expresses the subject; in (b), the same suffix -th expresses the direct object. Since the distribution of -th with respect to tense is the complement of the distribution of the second person singular absolutive suffix -kh, I call it ANTI-absolutive. For further discussion see Hook and Koul 1984, Hook 1984 and Hook 1985. (G plus number in parentheses identifies the examples from Grierson 1911, vol 1, part 2.)

⁹Grierson (1919:427) reports that dative suffixes in Poguli are also able to precede or follow ergative ones.

¹⁰Note the nominative second person singular direct object and the absolutive use of the second person singular pronominal suffix in the following (as cited by Master (1964:130) from the late thirteenth century Sri-krsnacaritra 47.8 and discussed in Hock, ms):

- (a) ambe, tU maajheaa vairiaa kaaraNE dukhav-al-ii-si
 mother you-NM my enemy reason torment-P-f-2sAB
 'Mother, you had to suffer on account of my enemy.'

Contrast the construction in (a) with the modern Marathi in which personal pronouns must get the dative and the second singular pronominal suffix is used agentially:

- (b) ambe, tu ma-laa aataa khup dukhav-al-a-s
 mother, you-ER me-DT now much torment-P-n-2SER
 'Mother, now you made me suffer a lot.'

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IMPACT OF EXPANDING DOMAINS OF USE ON A STANDARD LANGUAGE:
CONTEMPORARY HINDI IN INDIA¹

Yamuna Kachru

Discussions of Hindi, including linguistic descriptions, treat it as a monolithic entity. This paper points out that Hindi is not the name of a language, rather, it is an appellation used for a group of genetically related languages/dialects of North India. Modern Standard Hindi (MSH, hereafter) shows effects of prolonged contact with several Indian and non-Indian languages. In addition, the demands of its (new) roles as an official and a pan-Indian link language are having their impact on MSH. The paper describes the impact of the following circumstances on MSH: (a) the use of MSH as an official language in the central as well as several state governments; (b) its use in the media; and (c) its use as a medium of expressing literary creativity in several parts of India. As a result of these uses, contemporary MSH is exhibiting the following trends: (a) increased Sanskritization in the lexicon, but Englishization in the syntax; (b) increased use of colloquial Eastern and Western varieties and switching/mixing with regional languages/dialects in several genres; and (c) the emergence of a classical 'diglossic' (Ferguson 1959) situation. Implications of these developments for linguistic and sociolinguistic research, and for the use of MSH as a medium of education are discussed toward the end of the paper.

1.0 INTRODUCTION

Even a cursory look at the history of Hindi literature makes it clear that Hindi is not used as the name of a language; rather, it is used as an appellation for a group of dialects and languages (e.g. Avadhi, Braj, Hindvi, KhaRi Boli, Rajasthani, Urdu) which have been or are now functioning as media of literary creativity in the region known as Madhyadesh.² Besides, Hindi has been in contact with other languages -- both Indian and foreign -- for centuries. These include the languages of the New Indo-Aryan group, Sanskrit, Persian and Arabic (mainly via Urdu), and English. Several of the characteristics of the language known as Modern Standard Hindi derive from this heritage. For instance, the phonology of MSH is influenced by Perso-Arabic and Sanskrit, and more recently, by English. Its morphology and lexicon have been enriched by the same sources. In syntax, MSH has developed several alternative constructions in many areas, adapting selected patterns of all the languages mentioned above. The literary conventions of MSH have been borrowed and assimilated from Sanskrit, Persian (via Urdu), and English (in the beginning via Bengali and Marathi). Several folk traditions of the areas surrounding the Madhyadesh have found their echo in the literary traditions of MSH.³

This trend of assimilating linguistic and other features of languages with which Hindi is in contact continues even now, but with a difference. The difference is due to the changed and changing sociocultural, economic and political situation of the Hindi-speaking area. Some of the factors that have had an impact on Hindi language and literature are literacy, education, socio-economic mobility due to jobs in the government and industry, industrialization of the region, development of media including newspapers, journals, magazines, akaashvaani (All India Radio) and doordarshan, (Indian Television), and general political awareness generated by elections.⁴ One can add to this list, I am sure. My main aim is not to identify each and every factor that has had some role in the contemporary developments in Hindi language and literature. I would like to confine myself to four observations: (a) the use of Hindi for legislative and administrative purposes has led to an increased Sanskritization of the lexicon, but Englishization of the syntax; (b) the use of Hindi in the media (i.e. newspapers, akaashvaani, and doordarshan) shows the pull of four conflicting or complementary tendencies -- Sanskritization, Englishization, increased use of colloquial Eastern and Western varieties, and switching and mixing with regional languages such as Bengali, Marathi, and Punjabi; (c) the literary language used in criticism, memoirs, and fiction exhibits the same trends as in (a) and (b); and (d) there is a unique 'diglossic' situation developing in the Hindi area which has attracted very little attention from educationists and scholars of the region.

2.0 OFFICIAL HINDI

I would like to present data from a variety of sources to substantiate my remarks. First, I would like to present some data from the legislative and administrative registers to show that the language used in these contexts borrows heavily from Sanskrit and also reflects the transfer effects in translation from English. Consider the following excerpts from the Lok Sabha (Indian Parliament: Lower House) Bulletins:⁵

- 1a. sankhya 971
Number 971

sarkaari kaary ke liye samay kaa niyatan
Allocation of time for Government Business

Lok sabhaa aaj shree gulaam nabii ajaad dvaaraa pesh kiye gaye
Lok Sabha today Sri Ghulam Nabi Azad by moved

ek prastaav par saamat hui ki antarraajyik jal vivaad
a motion on agreed that Inter-State Water Disputes

(sanshodhan) vidheyak, 1986, [raajya sabhaa dvaaraa yathaapaarit,]
(Amendment) Bill 1986 Rajya Sabha by as passed

par vicaar tathaa paarit karne hetu 3 ghaNTe kaa samay
on consideration and passing for 3 hours of time

niyat kiya jaae.
allocation be done

On a motion moved by Mr. Ghulam Nabi Azad, Lok Sabha today agreed to the allocation of 3 hours for the consideration and passing of the Inter-State Water Disputes (Amendment) Bill, 1986, as passed by Rajya Sabha.

(From Lok Sabha: Bulletin - part II (General Information relating to parliamentary and other matters), Monday, March 24, 1986/Chaitra 3, 1908 (Saka): 1)

The separation of the postposition par 'on' from its object NP in the underlined part of 1a. provides an instance of the effect of English syntax. The order of the phrases in the sentence also points to the same factor. According to the rules of Hindi syntax, the sentence should have been as in 1b. Compare the position of the square-bracketed item in 1a. with the position of the same item in relation to the items underlined in 1b. to see the difference.

- 1b. lok sabhaa aaj shrii gulaam nabii ajaad dvaaraa pesh kiye gaye ek prastaav par sahmata huii ki [raajya sabhaa dvaaraa yathaapaarit] antarraajyik jal vivaad (sanshodhan) vidheyak, 1986, par vicaar karne tathaa use paarit karne hetu 3 ghante kaa samay niyat kiya jaae.

The same phenomenon is exhibited by the texts in 2 and 3:

2. kyaa sarkaar ne caaluu vittiiy varS sahit gat tiin
Q. government ag. current financial year with past three

varS ke dauraan baanko me baRhtii dakaitiy kii or
years of during banks in increasing dacoities toward

dhyaan diyaa hai jiske pariNaamsvaruup bhaarii
attention given has which of result as heavy

dhan kii haani aur aam jantaa ko pareshaani huii hai;
financial loss and common people to harassment happened has

...whether the government have taken note of increasing dacoities (robberies) in the banks resulting in huge financial losses and harassment to the public during the past three years including the current financial year;...

(From Lok Sabha: List of Questions for Written Answers, Wednesday, March 21, 1986/ Phalgun 30, 1907)

The underlined modifier bhaarii and the head noun haani 'loss' have been separated following literal translation word order of 'heavy financial loss' of English; the order should have been dhan kii bhaarii haani in Hindi. The awkwardness of the following passage can be traced to the same source -- translation from English without any consideration of the rules of Hindi syntax:

3a. ...caaval aur gehū̃ kaa adhikam utpaadan karnevaale pā̃c
rice and wheat of maximum production doer five

raajyō ke kramshah naam kyaa hā̃ aur unkaa kramshah
states of respectively name what are and their respective

utpaadan kitnaa hai...
production how much is

...the name of the first five states producing maximum quantity of rice and wheat respectively and their respective quantities...

(Same as 2: Q. no. 3751)

The way the Hindi question is phrased, the first kramshah 'respectively' applies to the names of states, and consequently, the second instance of the word yields the same reading. In order to bring the 'rice' and 'wheat' in the scope of 'respectively', the Hindi sentence should be phrased as in 3b.:

3b. ...kramshah caaval aur gehū̃ kaa adhikam utpaadan karnevaale pā̃c raajyō
ke naam kyaa hā̃ aur unkaa utpaadan kramshah kitnaa hai...

There are only three items of Perso-Arabic origin in these excerpts, pesh karnaa 'to move' in 1, ke dauraan 'during' and pareshaanii 'harassment' in 2. All the content words except these three items in 1a., 2 and 3a. are from Sanskrit.

The same phenomenon of Englishized syntax and Sanskrit content vocabulary can be observed in the language of Hindi newspapers. Consider the excerpts in 4a and b:

4a. chailenjar ke visphoT se amerikii antariks kaarykram ko lage dhakke
Challenger of explosion from American space program to suffered setback

se ubarne kii kSantaa ke pariikSaN ke taur par kal DelTaa raaket kii uRaan
from emerge of capacity of test of as yesterday Delta rocket of flight

ko dekhaa jaa rahaa tha.
DO seen being was

The flight of the Delta rocket yesterday was being seen as a test of the American space program's capability to extricate itself from the setback suffered as a result of the explosion of Challenger.

(jansattaa, May 5, '86: 2)

- b. ...nividaa ke kaagjaat kaam ke kisii bhii din ru. 100/ kii adaaygi...

The tender documents (can be had) on any working day on payment of Rs. 100/-...

(Same as a.: 2)

The tortuous syntax of 4a. and the use of dekhaa jaa rahaa thaa 'was being seen' are influenced by English. Even more noteworthy is the use of ru.100/- in the tender notice reproduced in part in 4b. According to the convention of Hindi, it should have been 100/-ru. Again, the news item is dominated by Sanskrit vocabulary. The same is true of the tender notices published in Hindi newspapers.

As regards administrative Hindi, the latest Administrative English-Hindi dictionary (Paliwal 1986) makes it clear that heavy Sanskritization of the lexicon of administration still continues.

3.0 HINDI IN THE MEDIA

The language of doordarshan presents a mixed picture. The news broadcast is not as heavily Sanskritized as that of aakaashvaanii. For instance, the news report of the bomb attack on the venue of the seven nation economic summit in Tokyo had the sentence in 5, and the weather bulletin is usually introduced as in 6. Items underlined in 5 and 6 are from Perso-Arabic sources.

5. isse koi nuksaan hone kii khabar nahii^{hi} milii hai.
this by any damage happening of news not obtained ia

There is no news of any damage from this (attack).

(May 4, 1986)

6. aur ab peish hai mausam kii jaankaarii.
and now present is weather of knowledge

And now the weather news is presented.

On doordarshan, several of the serials (comparable to prime-time soap operas of network TV in the USA) are written, produced, directed, and acted by non-Hindi speakers, and several are adaptations of well-known works by national and international writers in different languages. In these programs, there is heavy influence of English as well as regional languages such as Bengali, Marathi, and Punjabi. The following examples show the English influence:

7. anu, tum ek bahaut acchii laRkii ho, aise hii rahnaa.
Anu you a very good girl are like this remain

Anu, you are a very good girl, remain like this.

8. merii vaaif ko phon lagaaiye
my wife Do phone connect
Please put through my call to my wife.
9. cuuki ab anuubhav le cukii hūū...
since now experience take completed have
Since now I have had experience...
10. yah faarm par rahnaa sacmuc tumhaare ko Thiik nahīī baiThtaa.
this farm on living really you to right now sits.
This living on the farm does not sit well with you.
11. kyaa tum in projekT mē invaalv honaa caahoge?
Would you like to get involved in these projects?

(Episode 51, Khaandaan, 19-3-86)

In 7, following the requirements of English grammar, an indefinite article ek has been used in the predicate nominal, which violates the grammatical rules of Hindi. In 8, the Hindi idiom should have been X se phon milaanaa 'to establish telephonic connection with X'. Similarly, the idiom is anubhav praapt karna 'to gain experience', which would have been appropriate in 9. ...tumhē raas nahīī aataa is the expected idiom for 10. The sentences and fragments in 8-10 seem to be results of translation from English, and possibly Marathi. In 11, there is the usual mixing with English which is a characteristic of educated Hindi (or Indian) speakers.

4.0 HINDI AS A LITERARY LANGUAGE

In literary criticism, Sanskritization is the norm. The following is by no means an exception:

12. yah shīST sampradaay prabhutvashaalii varg kaa vah buddhijiivi
this civil community vested with authority class of that intellectual
bhaag hai jo saahityik maanyataaō ke dvaaraa puure samaaj par
part is which literary values through whole society on
us varg kii vicaardhaaraa kaa prabhutva kaayam kartaa hai.
that class of ideology of authority maintains
...isse yah niSkarS svabhaavtah nikaltaa hai ki saahityik
this from this conclusion naturally emerges that literary
maanyataaō aur saahity kii paribhaaSaaō ke viruddh sangharS
values and literature of definitions against struggle
vastutah ek kaThin vicaardhaaraatmak sangharS hai.
in fact a difficult ideological struggle is

This community of cultured citizens is that intellectual part of the ruling class which maintains the authority of its ideology over the entire society.... The conclusion is natural that any struggle against literary values and definitions is in fact a difficult ideological struggle.

(Singh 1983: 105)

All the underscored items are from Sanskrit or adapted from Sanskrit and one not schooled in this kind of 'High Hindi' will find it difficult to process such texts.

Contrast 12 with the excerpt in 13, which is from the genre of memoirs and takes the bilingual competence in English for granted:

13. kaalej se lauTe hue kuch der plaa[~]zaa me[~] baiThe rahe. aaj
College from returning a while Plaza in seated remained today

tabiiyat kaafii xush thii aur man halkaa thaa. vahaa[~]
mind very happy was and heart light was there

se uTh kar ghar cale aaye. armaa ko davaa[~]i laa dii.
from raising home came away mother to medicine bring gave

khaanaa khaane ke baad do gha[~]Te patr likhe. gyaan ko
meal eating after two hours letters wrote Gyan to

ek tej patr likhaa thaa, par use pos[~]T na kar duusraa
a sharp letter written had but that mail not doing another

pos[~]T kar diyaa. ma[~]i ne kabhii nahii[~] socaa thaa ki yah
mail do give I ag. ever not thought had that this

aadmii is kadar 'mi[~]iDaaakar' ho saktaa hai. ...vah vyakti
man this way mediocre be can he person

nahii[~] ek Taaip hai -- aur us Taaip ki apni[~] siimaa[~] hai.
not a type is and that type of own limitations are

(We) sat for awhile in the plaza on our way back from the college...I had written a sharp letter to Gyan, but I did not mail it, instead, I mailed another letter. I had never thought that the man could be so mediocre. ...He is not an individual, he is a type, and the type has its own limitations.

(Rakesh 1985: 46)

This, of course, is the ordinary idiom of colloquial standard Hindi spoken all over the Hindi area by educated Hindi speakers.⁶ Such mixing with English is common in almost all Indian languages.

The colloquial Eastern and Western varieties are different on all linguistic levels. In an earlier paper, I have discussed the syntactic

variation in the Eastern variety as compared to MSH (Kachru 1982). The phonological and lexical variations are well-known and partially documented in Hindi grammars. Till recently, the Eastern variety was not used in creative literature, or in the media. It seems that the stigma attached to the Eastern variety is fading and it is being used increasingly in writing as well as on the doordarshan. An example of the use of Eastern variety from fiction is presented in 14:

- 14a. ...dekhne kaa ciiz i laRkii dekhbe nahii kartii hai...
 seeing of thing this girl see emph. not does

This girl does not see things worth seeing. (see = notice)

- b. ...pataa nahii kaise i laRkii itne dabe rang kii hai. dono'
 known not how this girl such dark color of is both

baRii to Thiik hii thii. unke bakhat hanko itnii pureshaanii
 older emph. alright emph. were their time us to so much harassment

bhii nahii huii. vo bicaarii log baap ko kabhii
 also not happened those poor ones father to ever

pareshaan bhii nahii kii. magar i laRkii to baap kii pureshaani
 harassment also not did but this girl emph. father of worries

kabhii samajhtii hii nahii. are, jab turhaaraii surat-shakl
 ever understand emph. not excl. when your face-appearance

nahii, turhaare baap ke paas paisaa nahii, naukrii
 not your father loc. money not job

nahii, to tunko khud koshish karnaa caahiye ki nahii.
 not then you to self effort do desirable or not

kisii kaalej me' ghus jaao to hanko bhii muh
 any college in enter go then us to also face

rahega kahii baat calaane ko.
 remain will somewhere topic raise to

Who knows how this girl came to be so dark. The two older ones were alright. I was not harassed so much at their time (i.e. at the time of their marriage). Those poor girls never harassed me. But this girl never realizes her father's worries. Now, if you don't have looks, your father does not have money, does not have a job, then shouldn't you make an effort yourself? Get into a college job, then I will have the guts to start negotiations somewhere.

(Mishra 1986: 34)

The following features in 14a and 14b identify the text as written in the Eastern variety: lack of agreement between kaa and ciiz, i for

yah, and the construction dekhbe nahii kartii hai for dekhtii hii nahii hai (14a); i for yah as the demonstrative, bakhat for vaqt 'time'; vo bicaarii ... nahii kii instead of un bicaariyo ne ... nahii kiyaa, i.e. a nominative instead of an ergative construction, and the use of log 'people' to mark plurality in the noun; lack of agreement in koshish karnaa, and the construction with dative instead of genitive in hamko bhii muh rahegaa.

On the one hand the Eastern variety shows substratum influence, on the other, it is becoming highly Sanskritized as a result of the impact of the official language. An example of the latter phenomenon is seen in 15:

15. ...kaahe nahii hogaa iskaa. ...asal me ham bhor Tahalne
 why not happen will her reality in I dawn walk

gaye the, tabhii hamko bhiiitar kii sab baat pataa calii.
 done had then emph. I to inner all matter known became

...ek maarc se nayaa adhyaadesh aanevaalaa hai. uske
 first march from new ordinance about to come is it of

anusaar praadhyapaako kii niyuktii bhi likhit pariikSaa
 according professors of appointment also written examination

ke aadhaar par hongii. maane khulii pratiyogitaa
 on basis on be will meaning open competition

hii samjho. ... yah hai raajniiti kaa aadmii. ab yah khud
 emph. understand this is politics of man now he himself

cunav laRnaa caahtaa hai. uske liye caahiye paisaa. isiliye
 election fight wants that for need money that's why

jo hai rikt sthaano kaa vigyaapan nikalvaa diyaa hai.
 wh- is vacancies of advertisements published has

...kaafii paisaa banaa legaa yah
 much money make take will he

Why won't she get it (the job)? Actually, I went for a walk at dawn; it is then that I came to know the real facts. A new ordinance is going to be promulgated on March 1st. According to that, even the professors will be appointed on the basis of written tests. That means open competition. This one (the Vice Chancellor) is a man of politics. ...Now, he himself wants to fight the election. For that he needs money. That is why he has had the vacancies advertised. He will make a lot of money.

(Mishra 1986: 35)

In 15, there are three instances of variety-specific usage, namely, kaahe nahii hogaa, hamko...sab baat pataa calii, and isliye jo hai, the rest of the underscored items are examples of Sanskritization which char-

acterizes 'officialese' in the Hindi area.

This mixture of extreme Sanskritization and Eastern variety-specific features may sound peculiar to those used to MSH; however, it is a reality of the Eastern regions of the Hindi-speaking area.

Some examples of Western colloquialisms are the use of the ergative marker in the obligative construction, as in usne abhii jaanaa hai instead of usko abhii jaanaa hai '(S)he has to go just now', the use of the possessive form as a general oblique form of the personal pronouns as in mere ko pataa nahii thaa instead of mujhe pataa nahii thaa 'I didn't know', and regularization of certain irregular forms of verbs such as karaa/karii, etc. instead of kiyaa/kii, 'did' (m./f.) etc. These are becoming common in written as well as spoken forms of the Western variety, and one hears them regularly on doordarshan programs.

Another trend which strikes one in reading fiction, memoirs, and sketches is that of mixing regional languages such as Bengali, Marathi, and Punjabi with Hindi, often without any explanation. Examples of such mixing are given in 16, 17 and 18:

16. 'saccii baat kahe jii ki aaj ke din jidhar 'takk' maaro
true matter say that today of day wherever glance hit

bas saahab hii saahab. aur kuRiyaa, kaakiyaa bhii misaa aur
Sahab emph. Sahab and young girls also misses and

menaa banii ghuumtii haai. ...'
Mem Sahab becoming go around

The truth is that wherever you look today, all you see are Sahab (British gentlemen). And young girls are also going round pretending to be (British) Misses and Ladies.

(Sobti 1977: 60)

In this Punjabi-mixed passage, the single quotes surrounding the word takk 'glance' alert the reader that it is a borrowed item, but no such warning is given with kuRiyaa and kaakiyaa 'young girls'. Bilingual competence in Punjabi and Hindi is taken for granted in such texts.

The example in 17, by an author from the Eastern region, shows mixing with Bengali:

17. tiisre pahar, faNaa kii kaakii (aamaader na' kakii-maa) dauRtii
late afternoon Fana's aunt our Na' aunt running

haaphtii aayii...
panting came

"kii khabar? latikaa baaRiite neii!"
What news Latika home in not

'latikaa se nahii, tumse kaam hai. ...faNaa, maane malay
Latika with not you with job is Fana, i.e. Malay

ke pulise aresT koreche... hāā, kolkaataa theke puliser lok
to police arrest done have yes Calcutta from police of people

esechilo. ... haa, haathkaRaa haate diye, komore dorii-rassii me
come had yes handcuffs hand in giving waist ropes in

bāādh kar, saRak par Tahlaate hue, haajat mē le gayaa. ...
tying road on walking lock up in take went

hāā, sirf kitaab ke liye! ghar kii puurii khaanaatalaashii --
yes just book for house of complete search

tann tann karke kaagaj-pattar, TaaipraaiTar, baii-sab niye gelo!"
thoroughly papers letters typewriter books all take went

"keno? keno??"
why why

"Kii jaanii! aaj subah ko jamaanat par chuuTkar aayaa hai.
what know today morning bail on free come has

kal, kalkattaa calaa jaaegaa!"
tomorrow Calcutta move go will

Late afternoon, Fana's aunt (the one we called Aunt Na') came running and panting. ...

"What news? Latika is not home."

"I want to see you, not Latika. ...Fana, i.e. Malay has been arrested by the police, ...Yes, the policemen had come from Calcutta. ...Yes, they took him to the lock-up, handcuffed with a rope, marching him on the streets.... Yes, just for the book! The house was searched, thoroughly, books, papers, typewriter, they took everything!"

"Why? Why?"

"Who knows! He came back this morning, free on bail. He is leaving for Calcutta tomorrow."

(Renu 1984: 102)

In the above excerpt, there are some passages which are totally in Bengali, namely, the second and third underscored items. Others are a mixture of Bengali and Hindi. Those not familiar with Bengali will have a hard time interpreting the text.

In 18, there is mixing with Marathi:

18a. ...usii mulge ne puuchaa hai -- "kasaa vaaTo re?"
the same boy ag. asked has how feels hey you

"mii ta kharo kharac aaggaaRii jhaalaa."
I emph. really train became

The same boy asked, "Hey, you! How does it feel?"

"I have really become a train."

(Bakshi 1984: 14)

b. ab maĩ yah kah saktaa hũũ ki akkaa baRii kanjuus hai.
now I this csay can that mother very miserly is

...unhõne ek pishvii banvaa rakhii hai laal rang kii.
she ag. a bag make cause kept has red color of

aNaa ek baar DyuuTii se lauTe to ek laal jhaNDii le
father once duty from returned then a red flag take

aaye the. bahut dinõ tak to ham us jhaNDii kaa upyog
come had many days till emph. we that flag of use

rel-rel kheIne mē karte rahe, phir ek din akkaa ko kuch
train playing in doing kept then one day mother to something

suujhaa to uskii pishvii sii Daalii
occurred then its bag sew poured

Now I can say that Mother is very miserly.... She has sewn a red bag. Once, when Father returned from his job, he brought a red flag. For a long time, we used it to play train, then one day, something occurred to Mother and she made a bag out of it....

(Bakshi 1984: 14)

In 18a., the use of Marathi in the direct quotes is perhaps for characterization, i.e., it is used to identify the two characters explicitly as Marathi speakers. But the excerpt in 18b. is from the narrative part of the text. There is no lexical gap in Hindi which is filled with items such as pishvii 'bag', even if one grants the use of the terms of address for 'father' and 'mother' for locating the text in its proper geographical/regional context.

This trend of mixing with regional languages is noticeable in doordarshan advertisements also. Products are shown and remarks about them are made by people from various regions in their own languages before the concluding remark or jingle is broadcast either in Hindi or English.

5.0 MOTIVATIONS FOR MIXING

One can speculate on the reasons for these kinds of mixing. It seems to me that in literature, the mixing with regional dialects, varieties, and New Indo-Aryan languages is motivated by the fact that authors from various regions are asserting their regional identities. There does not seem to be any inhibition in mixing freely items from various sources, there is no self-consciousness, no apprehension of 'pollution' that may plague the purist. In the earlier periods of Hindi literature, such mixing was confined to the regional dialects within the Hindi area; now, with the consciousness of the role of Hindi as a national official as well as link language, writers from various regions are, as it were, contributing toward developing a national character of the language. Whether this trend is healthy, or desirable, is another question. Most literary scholars and linguists I had the occasion to discuss these questions with agreed that the trend seems to be inevitable, and in the absence of any authoritative agency that could 'impose' a uniform 'standard', it is difficult to see how this could be blocked. In fact, there does not seem any need to block any development at this stage; these recent developments may result in enriching the language.

The doordarshan advertisements and programs, of course, are motivated by quite a different factor. The audience of the TV programs is nationwide, hence, the language has to be flexible. In popular programs as well as public opinion surveys, impromptu interviews, advertisements, etc., the language is not of primary concern. The way people speak in language-contact situations is found natural and acceptable, hence, there is no attempt to edit their language. This, of course, is true of TV advertising, interviews, etc., in native English-speaking contexts of the U.S.A., too. In addition, the various 'accents' or languages in U.S. advertisements may be associated with various products (e.g. Italian with pasta or French with perfume); in the Indian context, mixing with various Indian languages is intended to show the nationwide popularity and appeal.

6.0 QUESTION OF STANDARDIZATION

The trends identified in this paper raise some very important questions for standardization which are of concern to policy makers and educationists. First, both Sanskritization and Englishization have created a situation such that the official language used in administration and laws, and to a lesser extent in newspapers, literature, akaashvaani, and doordarshan is markedly different from the colloquial standard. This is creating a type of 'diglossic' situation in the Hindi area. Second, the emergence of marked differences between the Eastern and Western varieties is bound, sooner or later, to lead to a situation where problems of standardization will have to be tackled. For instance, certain Westernisms have been accepted as legitimate variations to the standard at least in some texts used in schools, as is clear from the excerpt in 20:⁷

20. ...tabhii gurujii ne hamē' bataayaa ki tum ne baRe ho kar
 then emph. teacher erg. us told that you erg. big be CP

netaa, vakiil, DaakTar, injiiniyar aadi bannaa hai to
 Leader lawyer doctor engineer etc. become is then

tum jo bhii banaa cahte ho vah abhii se apne man
 you whatever become want that now from self's mind

mē dharaan kar lo aur usii ke anusaar jii-jaan se
 in hold do take and that emph. according to life with

parishram karo
 labor do

Then the teacher told us that if we wanted to become leaders, lawyers, doctors, engineers, etc., when we grew up, then we should keep that in mind from now on and work hard accordingly.

The underlined clause in 20 is acceptable in Western colloquial Hindi, though in MSH, the obligative construction requires a dative ko, as in tum ko baRe ho kar ... bannaa hai. The same text also contains the following with an obligative construction that conforms to the MSH norm:

21. yadi vidyaarthiiyo ko jiivan mē mahaan vyakti bannaa hai, to
 if students to life in great individual become is then

unhē 'acchaa vidyaarthii' bannaa hoga.
 them to good student become be will

If students wish to become great men in their lives, they will have to become 'good students'.

The question arises, if the obligative construction in 20 is acceptable as a legitimate variant, is the nominative construction ham kitaab paRh liye hai, common in the Eastern variety, equally acceptable as a variant of the MSH ergative construction māi ne kitaab paRh lii hai 'I have read the book'? Of course, such acceptance of variation will have profound implications for the nature of MSH. The debate on these questions has not begun yet.⁸ In view of the wide impact of media, especially doordarshan, however, some discussion of these issues seems to be necessary

7.0 CONCLUSION

Increased use of Hindi in media and literature, its expansion to domains such as administration and law, and the demands placed on it as a 'link' language in the multilingual context of India have all contributed to several related developments that have resulted in changing the character of Hindi. Whereas Hindi, since its history began, exhibited the tendency to 'mix' regional dialects and Sanskrit for certain purposes, mixing with the New Indo-Aryan languages, Arabic-Persian, and English is changing the structure of the language. The development of distinct varieties such as the Eastern and Western are posing other problems

related to standardization, educational medium, etc.

For the linguist, the challenges are obvious. The first is that of description. What tools do we have to describe a Hindi which is not a language but a well-knit group of codes with domain-specific as well as wider uses? Depending upon the domains of use, some of the codes are fairly homogenous, e.g. colloquial Hindi or Hindustani. Others are mixed with elements from regional dialects; regional languages such as Bengali, Punjabi, Marathi; classical languages such as Sanskrit, Arabic-Persian, and a recently indigenized foreign language, English. Next, for a socio-linguistic description, the question arises: What kind of methodology is appropriate to use in determining the domains of use of Hindi in its various forms? It seems to me that the present state of the Hindi area suggests the anthropological method of intensive and extensive participant observation rather than the sociological method with its requirements of survey data and measurable causes (Fasold 1984).

For the educationist, the problem is that of achieving goals in literacy and at the primary and higher levels of education. At this point, I am unable to find any statistical data on the rate of failure at the primary and other levels of schooling in the Eastern regions of the Hindi-speaking area. The syntactic differences between the Eastern and MSH varieties are so great that a significant rate of failure can be expected. If this apprehension is proved correct, the statistical evidence will raise a serious question: Should the Eastern variety be used for educational purposes at the elementary levels and MSH be taught as a second language at some stage of post-primary education?

For linguists interested in language and society, Hindi provides a unique opportunity of studying the interplay of various socio-political, linguistic, and cultural forces.

NOTES

1. I am grateful to the University of Illinois for granting me a sabbatical leave of absence (Spring 1986) and to the American Institute of Indian Studies for awarding me a Senior Faculty Research Fellowship in 1986-87 which enabled me to conduct field work in India. This paper is partially based on the work I did during January - May 1986 while in India.
2. It is encouraging to note that this fact is slowly being recognized by literary scholars as well. This is evident from the editorial entitled *kyaa hindii kSetriiya bhaaSaa hai?* 'Is Hindi a regional language?' in *samiikSaa*, a periodical devoted to literary criticism, in its issue of July - September 1986.
3. The folk traditions and dialects of the Hindi area are still contributing to the revitalization of contemporary Hindi drama, as pointed out in Rai 1986.

4. aakaashvaanii and doordarshan are the names of the All India Radio and the Indian Television, respectively.
5. The following convention of transcription has been followed in the paper: (a) the doubling of vowels indicates a long tense vowel; (b) capital letters indicate a retroflex flap; (c) capitalization and conventional spelling have been used for institutionalized words borrowed into English from Indian languages, e.g., proper names and names of institutions such as the Lok Sabha, the lower house of the Indian Parliament.
6. Sobti 1977 contains the following exchange between several well-known writers of Hindi and P.A. Barannikov, a famous scholar of Hindi from the Soviet Union:

'aap kuch kah rahe the!
you something saying were

'sirf itnaa hii ki aap log na battii bujhaate hai, na gul karte
only this emph. that you pl. not lamp douse not extinguish

hāṭ, ab aap 'laaiT' 'aaf' karte hāṭ.
now you light off do

(hindiivaalō kii or se sirf khisiyaanii hāsii)
Hindiwallhs from only embarrassed laughter

'aap ko 'bas' bhii 'bai caans' miltii hai.'
you to bus also by chance obtains

' 'bai caans' isliye ki 'regular' nahii miltii.'
'by' 'chance' because 'regular' not obtained

(raajendra yaadav kaa javaabii hamlaa -- kariib-kariib misfaayar)
Rajendra Yadav's answering attack nearly misfired

'aap nimantraN yaa daavatē 'aksept' karte hāṭ yaa 'rifyuus' karte
you invitations accept do or refuse do

hāṭ. yah bhii kahte sunaa hai ki 'pichle mahiine merii 'sisTar'
this also saying heard have that last month my sister

kii 'mairij' thii.' 'mere 'ankal' kii 'Deth' ho gaii hai.' 'aaj
of marriage was my uncle of death be went has today

meraa 'apaaiNTmeNT' 'DaakTar' se hai.'....
my appointment doctor with is

'You were saying something!'

'Only this that you no longer extinguish lamps (bujhaanaa = a native Hindi verb meaning 'douse a flame, fire'; gul kamaa = Perso-Arabic borrowing meaning the same: YK), you (switch) 'off' the 'light.'

(Embarrassed laughter from the Hindi writers)

'You also get the 'bus' 'by chance'.'

'By chance' because we do not get it 'regular' (i.e., regularly: YK).'

(Rajendra Yadav's repartee almost misfired.)

'You also 'accept' or 'refuse' invitations (nimantran = Sanskrit word for invitation; daavat = Perso-Arabic borrowing with the same meaning: YK). I have also heard people say 'my' 'sister's marriage' took place last month.' 'My 'uncle' is 'dead'.' 'Today I have an 'appointment' with the 'doctor'.'...

Barannikov's comments are justified in view of how English-mixed Hindi is used by educated speakers of Hindi.

7. The excerpts in 20 and 21 are taken from Nibandh Rashmi (n.d., pp. 104 and 29), published by Nina Publications (Regd.). The book is sold in Delhi and claims to be 'for primary school children according to the syllabus of the Education Department.'
8. Except for the editorial in samiikSaa referred to in footnote 2, I did not come across any discussion of the issues related to standardization or variation in any other forum in India.

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THE ERGATIVE CASE IN HINDI-URDU*

Baber S.A. Khan

Postpositions in Hindi-Urdu are traditionally considered as case markers. Some of the cases realised by postpositions are treated as **structural** while other oblique cases are understood to be **inherent** ones. As such, *koo* is usually described as realising the dative-accusative case while *nee* marks the ergative case. The assignment of dative and ergative case to NPs in subject position, a position which is ordinarily assigned the nominative case, has remained problematic. The problem of specifying the case assigning elements to subject NPs may be circumvented if postpositions are treated as markers of **inherent** case, assigned at D-structure and associated with theta roles, while the **structural** case is restricted to the nominative and accusative case realised at S-structure and marked by the absence of postpositions.

0. INTRODUCTION:

Ergativity in Hindi-Urdu (H-U) has been described as a surface phenomenon that is strictly linked to perfective aspect. However, the ergative case is not assigned to subject NPs in all or every perfective sentence. Neither is the ergative marker *nee* necessarily associated with **transitivity** or with such semantic properties of the referents of NPs as 'animacy' or 'definiteness'. In fact, no syntactic rules except for the rule of verb agreement appear to crucially refer to the ergative alignment. Even the verb agreement rule is not totally sensitive to the ergative-absolutive pattern.¹ These and other facts have raised questions about the relevance of the ergative-absolutive alignment to the rule system of H-U. It is not totally unreasonable to ask whether the so-called **ergative case** has anything to do with ergativity at all. If *nee* is not the marker of ergative case then it is worth exploring what it stands for and how it gets assigned to subject NPs in perfective sentences.

This paper attempts to provide answers to questions like the one posed above. The first part of the paper consists of arguments suggesting that postpositions in H-U, contrary to common belief, do not reflect **structural** case. In general, they underscore the thematic roles and mark the **inherent** case assigned to NPs at D-structure when NPs are θ -marked by verbs (Chomsky 1986). The discussion will focus primarily on roles signaled by the postpositions *nee* and *koo*. It is assumed that oblique case assigned and marked by other postpositions can be accounted for by the same principles.

The second part discusses the mechanism by which case is assigned to NPs marked with *nee*. This will be done within the formal framework of Government and Binding theory. To be assumed are the general principles and conditions of the Theta and Case theories as developed in the relatively recent works of GB theory.

1. POSTPOSITIONS AS CASE MARKERS:

Postpositions like *nee* and *koo* have traditionally been described as structural case markers. *Nee* is referred to as marker of ergative case while *koo* is generally described as marking the dative-accusative case. It is my contention that these postpositions do not signal structural case at all. Instead, they mark the thematic roles (e.g. agent, patient, experiencer) assigned by the verbs to the NPs. The data given below provide ample evidence for treating these postpositions as markers of inherent case associated with θ -roles. In the discussion that follows, I shall assume that the term *dative* does not refer to the semantic notion of recipient. Instead, as commonly described in the literature, the term *dative* corresponds to the syntactic term *indirect object* just as the *accusative case* refers to *direct object*.

Given that grammatical relations are configurationally defined, the unmarked linear order of their occurrence in H-U appears as below:

Subject - Indirect Object - Direct Object - Verb (Gambhir 1981).

NPs ordinarily occupying the indirect object (dative) position are marked by *koo*. Yet, that position in H-U is not always associated with *koo* and, hence, *koo* cannot be considered a defining element for a syntactic category. The following examples illustrate that the choice of a specific postposition depends on the semantic role assumed by the NP and has nothing to do with the NP's occurring at the indirect object position.

- (1) $m\bar{e}$ nee apne doost **koo** kitaab dīī
 I ERG self friend D/A book gave?²
 'I gave the book to my friend.'
- (2) (a) $m\bar{e}$ nee apne doost **see** kitaab liī
 I ERG self friend from book took
 'I got the book from my friend.'
- (b) * $m\bar{e}$ nee apne doost **koo** kitaab liī
- (3) (a) $m\bar{e}$ nee meez **par** kitaab rakhīī
 I ERG table on book put
 'I put the book on the table.'
- (b) * $m\bar{e}$ nee meez **koo** kitaab rakhīī

The verb *deena* 'to give' in (1) subcategorizes for a recipient NP marked with *koo* in the indirect object position. However, the verbs *leena* 'to take' and *rakhna* 'to put' in (2) and (3) respectively necessitate that the NPs in the indirect object position be marked with instrumental postposition *see* 'from' and the locative postposition *par* 'on'. The cases assigned to NPs in the indirect object position are clearly not structural, a case assigned independently of thematic relations (Chomsky 1986).

There is also little evidence for *koo* to be considered an accusative case marker. The passive rule in H-U provides support for the view that *koo* does not mark the accusative case. Passive morphology is said to absorb the case. One would expect that *koo*, if a marker of accusative case, would disappear with the application of the passive rule. However, when the passive rule promotes a direct object to subject position, *koo*, when present in the corresponding active clause, may still appear with the new subject indicating that, in fact, it is not an accusative case marker at all.

- (4) (a) un^hōō nee puliis **koo** bulayaa
 they ERG police D/A called
 'They called the police.'
- (b) puliis **koo** bulayaa gayaa
 police D/A called went
 'The police were called.'

The occurrence of *koo* with NP in the direct object position is optional and depends on the semantic properties of the NP. It is generally believed that *koo* marks the direct object for 'definiteness' and 'animacy' (Kachru 1966; Moravcsik 1978; Wierzbicka 1981). As the examples below indicate, neither of these semantic properties is sufficient to condition the occurrence of *koo*.

- (5) is meez **koo** udhar rakhoo
 this table D/A there put
 'Put this table over there.'
- (6) (a) ham nee **ek** baccee **koo** bhaagtee huwee dekhaa
 we ERG a child D/A running saw
 'We saw a child running.'
- (b) us nee kisii šaxs **koo** ittelaah nahī kii
 he ERG any person D/A information not did
 'He didn't inform anyone.'
- (c) kuch ciizōō_i **koo** tum sambhaaloo, kuch e_i **koo** mē
 some things D/A you take care some ϕ D/A I
 sambhaltaa hūū
 take care am
 'You take care of some of the things, (while) I take care of
 (the remaining) some.'

In sentence (5) above, an inanimate object, *meez* 'table', is marked with *koo*. In (6a), *koo* appears with an indefinite NP overtly marked with the indefinite article *ek* 'a, an'. *Koo* also occurs with NPs that are marked with indefinite determiners like *kisii* (6b) and *kuch* (6c).

It seems that the occurrence of *koo* with the direct object is conditioned by two semantic factors: the NP involves a specific reference and/or is assigned the θ -role of patient/recipient/experiencer by the verb. The claim that *koo* signals specific reference is supported by the fact that the direct object NP, in contexts involving non-specific reference, does not cooccur with *koo*.

- (7) voh machlii (*koo) pasand nahii kartaa
 he fish D/A like not does
 'He does not like fish.'
- (8) is faarm par hukumat hiran (*koo) paaltii hai
 this farm on government deer D/A raise is
 'The government raises deer on this farm.'

In both (7) and (8), the direct object involves generic reference that makes *koo* unacceptable in the intended generic sense of the sentence. The use of *koo* in the above sentences gives the awkward reading whereby *machlii* 'fish' and *hiran* 'deer' refer to some particular member of the species.

It is generally understood that stative verbs are closely associated with generic reference in the noun phrase while dynamic verbs are linked to specific reference (Quirk et al. 1972). In H-U, generic reference is not signaled by any overt marker. Instead, NPs signaling generic reference commonly occur in clauses that involve stative verbs like the imperfective form of the verb *hoo* 'to become' and the finite form of the verb *honaa* 'to be' (Kachru 1980). It is not a coincidence that *koo* is rarely, if at all, used in clauses involving stative verbs where NP signals generic reference.

At times 'animacy' does appear to condition the occurrence of *koo* with direct objects.

- (9) bacce koo uṭhaaloo
 child D/A pick up
 'Pick up the child.'
- (10) kitaab (ʔkoo) uṭhaaloo
 book D/A pick up
 'Pick up the book.'

In (9), *koo* appears to be obligatory with an animate NP whereas in (10) it is awkward with an inanimate object. However, when the sentence in (9) is read without *koo*, the reading does provide a generic sense, albeit very awkwardly.

- (11) ʔbacca uṭhaaloo
 'Pick up a child'

It is interesting to note that the noun *bacca* 'child/baby', which may also

refer to animal babies, appears in (9) above to refer to a human child only. When an NP refers to an animal baby, *koo* becomes optional although the entity referred to is still an animate one.

- (12) billi {kaa bacca uṭhaloo
 {kee baccee *koo*
 cat of baby D/A pick up
 'Pick up the kitten.'

It seems that reference is a matter of degree and animate entities appear to involve inherently more specific reference than the inanimate objects on a continuum of specificity. Among the animate entities, the human ones are probably more specific than the non-human ones. Within the set of NPs that refer to human entities, it is probably the case that a certain subset of these NPs such as personal names, pronominals, kinship terms, etc., necessarily involve specific reference which may account for their being marked with *koo* in the direct object position. Abstract and mass nouns appear to share properties of NPs involving non-specific reference and hence the sentence becomes awkward when *koo* marks an abstract or mass noun in the direct object position.

- (13) is dawaa nee buxaar (¹*koo*) utaar diyaa
 this medicine ERG fever (D/A) brought down
 'This medicine brought the fever down.'

- (14) us nee jaldii jaldii kaafii banaai
 {**koo* banaayaa
 he ERG hurriedly hurriedly coffee made
 'He hurriedly made coffee.'

The data discussed so far suggest that the occurrence of *koo* with the direct object is closely related to referential properties of the NP and has little to do with accusative case.

As mentioned earlier, *koo* also highlights the patient/experiencer role of the direct object. It is relatively more conspicuous in contexts where the flexible nature of H-U word order makes sentences potentially ambiguous in that either of the two NPs could be interpreted as agent or patient.

- (15) hiiraa hiiraa kaṭṭaa hai
 diamond diamond cut is
 'Diamond cuts diamond.'

Given the normal intonation pattern, the first NP in (15) is interpreted as agent and the second as patient. However, for a large number of native speakers, the first NP may equally well be interpreted as patient if a pause is introduced between the two NPs. This ambiguity may be dispelled by marking the patient NP with *koo* irrespective of its place of occurrence in the sentence.

- (16) (a) hiiraa hiiree koo kaṭṭaa hai
 (b) hiiree koo hiiraa kaṭṭaa hai
 'Diamond cuts diamond.'

To sum up the above discussion, the presence or absence of *koo* in the direct object position is partially conditioned by the referential properties of the NP and partially by the θ -role assigned to the NP occurring in that position. There is little justification for treating *koo* as a postposition reflecting the dative-accusative case.

Chomsky (1986:193) observes that of all the case-assigning lexical categories, only V, together with INFL containing AGR, assigns structural case at S-structure. Other case-assigning categories, P, N, and A, assign inherent case associated with θ -marking at D-structure. In H-U, however, V appears to assign inherent case (in conjunction with INFL) to NPs in subject position. The examples below demonstrate that the assigned θ -role of subject NPs, marked by postpositions such as *nee* and *koo* is conditioned by the selection of the verb. The selection of a specific postposition, therefore, depends on the assignment of the specific θ -role to the NP.

- (17) (a) us nee cooṭ khaaii
 he ERG injury ate
 'He got hurt.'
- (b) us koo cooṭ lagii
 he D/A injury felt
 'He got hurt.'
- (18) (a) us nee inaam paayaa
 he ERG reward found
 'He got a reward.'
- (b) us koo inaam milaa
 he D/A reward met
 'He got a reward.'
- (19) (a) us nee ghussa kiyaa
 he ERG anger did
 'He got angry.'
- (b) us koo ghussa aayaa
 he D/A anger came
 'He got angry.'

The above pairs of sentences are identical in terms of propositional content, yet they differ in surface manifestation. The verbs in the (a) sentences

above assign the agentive role to subject NP that get marked by the postposition *nee* in the perfective aspect. The verbs in the (b) sentences, however, assign the dative/recipient/experiencer role to the subject NPs though the meaning of the sentence in each case is identical to the one expressed in the corresponding (a) sentence. It is interesting to note that in the above pairs of sentences, the subject NPs in both sentences denote entities which are eventual recipients or experiencers in absolute semantic terms yet the verbs in the (a) sentences subcategorize for NPs that, in some intuitive sense, are volitional participants of the action while the NPs in the (b) sentences indicate an involuntary participation on the part of entities they denote.

2. THE ASSIGNMENT OF *NEE*:

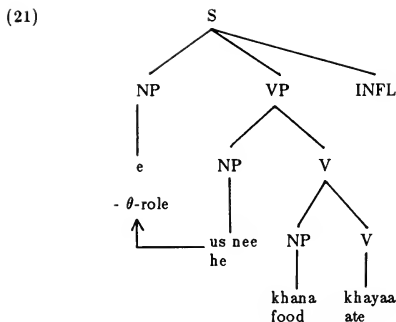
Because the so-called ergative NP is marked with the postposition *nee*, it lacks the property of verb agreement usually associated with subject NPs in the nominative case. But the ergative NP does show other subject properties such as clause initial position, control of null subjects and of reflexive NPs, etc. Given that subjects in H-U derive the syntactic property of subjecthood by occupying a configurationally defined subject position in the phrase structure tree, the problem remains of how *nee* is assigned to subject NPs in perfective structures.

Some treatments of non-nominative subjects (Hermon 1981; Davison 1985) suggest that these NPs originate in object position at D-structure and, after receiving case at S-structure, move to a configurationally defined subject position in the derivation of LF. Thus, the non-nominative subjects acquire subjecthood at LF and not at S-structure.

Keeping such an analysis in mind, we may consider the following representation of the so called ergative sentences at D-structure.

- (20) S[NP-e INFL VP[NP-*nee* V' [NP V]]]

The structural representation in (20) above also holds at S-structure. Both θ -role and case is assigned at D-structure and checked at S-structure by the appropriate filters. However, the ergative NP in (20) originates inside the VP constituent and as such is assigned case by V. If the so-called ergative NP behaves like other subjects, which it does, it has to move out to a structurally defined subject position. Since move- α is an optional rule and, at the same time no other principle appears to be violated by the ergative NP for occupying that specific position, there seems to be no reason why the NP marked with *nee* should be moved out in the derivation of S-structure. Such a movement, therefore, will have to take place in the derivation of LF and the ergative NP, parallel to non-nominative subject, may be interpreted as subject in the LF component. We may illustrate a simplified structural representation of (20) above, at the LF level, in (21) below.



The structure represented in (20) suggests the possibility of deep (or syntactic) ergativity. Since there is no independent evidence that H-U involve deep ergativity (see e.g. Kachru and Pandharipande 1976), the structural representation given in (20) is of little significance. Moreover, such a representation requires the subject NP to appear in a non- θ -position in an argument chain. This unnecessarily complicates the grammar since no such subcategorization is needed for subject NPs marked with nominative case.

An alternative analysis may appear to be more plausible where V assigns *nee* to subject NPs under theta-government via INFL. For the purposes of such an analysis, I shall adopt the model of Case theory as developed in Levin & Massam 1985. Given below is the summary of some of the principles and conditions relevant to our analysis.

- (22) Z^0 governor, then Z^0 has associated with it C_z ,
 where $C =$ Abstract Case. (Levin & Massam (3))

C_z is to be viewed as a feature the assignment of which by an element is subject to the conditions on case assignment.

- (23) Conditions on Case Assignment (Levin & Massam (4))

- A. C_x must be assigned.
- B. C_y ($y \neq x$) can be assigned only under theta-government.
 (External theta-role assigned by VP via INFL)
- C. Case is assigned only under government.

Condition A is relevant for nominative-accusative systems where INFL very often assigns case to NP/S. However, for H-U, where inherent case is assigned by certain verbs, condition B is also relevant. C_y may be realised in a subject NP, marked by *koo*, when VP assigns the dative/experiencer role as

external theta-role to the NP. Elsewhere, when the sentence is in the perfective aspect, the value of y may be realised as *nee* when the subject NP is assigned the external θ -role of agent. Since perfective aspect is equally crucial to the assignment of *nee*, aspect has to be accommodated within the structure of INFL.

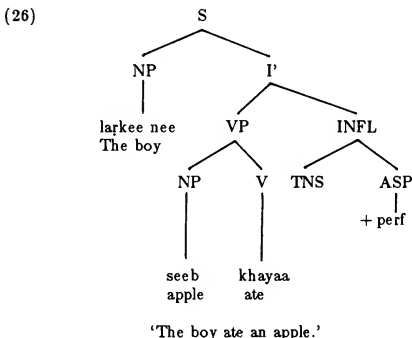
(24) INFL -----> TENSE, AGR, ASP

The assignment of either nominative or ergative case will, then, depend on the value of ASP which may be stipulated in terms of a [\perp PERFECT] feature. If INFL contains [+ PERFECT], it will assign *nee* to the subject NP, otherwise the nominative case will be assigned.

We can now propose an alternative structure to (20) above where *nee* originated inside VP.

(25) S[NP-*nee* I'[INFL VP[NP V]]]

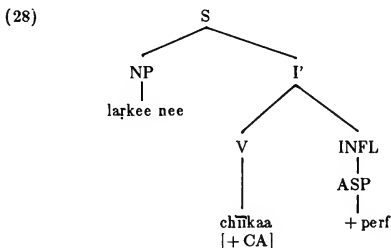
The structure in (25) above holds both at D and S-structure. NP-*nee* originates in subject position and is assigned case under θ -government by VP via INFL. The accusative case is assigned by the verb and its realisation is marked either by *koo* or by ϕ depending on the relevant semantic factors. The structure in (25) may be illustrated as below.



Another important assumption by Levin & Massam is the introduction of a feature [\perp CA] as a property of all lexical governors. The feature [+ CA], where CA stands for Case Assignment, makes it obligatory for an element to assign a case if it has the feature. Such an assumption is crucial for the assignment of *nee* in intransitive clauses. Intransitive verbs generally do not assign case. Yet, there are dialects of H-U wherein some intransitive verbs would appear to assign *nee* to their single argument.

- (27) laṛkee nee chīṅkaa
 boy ERG sneezed
 'The boy sneezed.'

This can be accounted for by the feature [\pm CA]. All the verbs in intransitive clauses with *nee* have the feature [+CA] which in conjunction with [+PERFECT] in INFL causes *nee* to be assigned to the subject. The structure of (27) above may appear as in (28) below.



At this point the only problematic case that needs to be accounted for is the existence of a small number of transitive verbs that do not take *nee* despite the perfective aspect. No ready solution is available except that these verbs should be treated as exceptions. It is probably the case that for all such verbs the value of the Abstract Case as determined by (22) is [+nominative] which is assigned to subject NP, despite the perfective aspect, by virtue of the presence of the feature [+CA].

3. CONCLUSION

In H-U, the assignment of *nee* to subject NPs in perfective aspect has been considered problematic. Within the GB framework, the occurrence of *nee* in subject position can be accounted for if NPs marked with *nee* are treated as instances of inherent case as defined by some general principles of Theta and Case theories. As demonstrated in the first section of the paper, *nee* appears to mark the agentive role of the subject NPs. As such, it can justifiably be treated as a marker of inherent case which is assigned under θ -government by V via INFL. The assumption that all case assigning lexical categories have a feature [\pm CA] also accounts for the few intransitive verbs that assign *nee* to their subjects. It is suggested that the verbs in transitive clauses that do not show *nee* are lexically marked for the assignment of nominative case.

NOTES

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¹ See Kachru and Pandharipande (above cite) for examples and related discussion.

² Following common practice, I shall gloss *nee* as ERG (ergative) and *koo* as D/A (dative-accusative).

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REMARKS ON DRAVIDIAN COMPLEMENTATION*

Sanford B. Steever

The morphological and lexical bases of Dravidian complementation are explored by proposing a series of rules that govern the distribution of finite predicates in the Dravidian sentence. The distribution of two verbs, *a-* 'become' and *en-* 'say' is shown to be correlated with the distribution of finite predicates. They owe this to the fact that they are negative absolute exceptions to case-marking. Certain syntactic changes in North Dravidian are shown to be accomplished by increasing the number of predicates that are exceptions to case-marking, rather than by blindly imitating Indo-Aryan structures. The hypothesis of brute-force convergence is rejected as an explanation for these syntactic changes in favor of one that utilizes native lexical, morphological and syntactic resources in diachronic syntax.

0. Introduction. The commonplace observation that different languages may express the same grammatical concept in radically different ways is the foundation of many language typologies, the most celebrated of which is Sapir's. According to a somewhat less subtle typology, languages may be said to differ according as they encode certain grammatical concepts in morphology or syntax. Close to the center of Sapir's typology, the Dravidian languages rely extensively on their morphology and lexicon to carry out those grammatical tasks which more peripheral languages, such as Chinese or English would entrust to their syntax. This difference is illustrated here with the use of morphology and lexicon in the formation of complex sentences in the Dravidian languages. Attention is focused on the crucial roles played by two verbs which are exceptions to the rules of case-assignment in the construction of complex sentences.

Certain conventions, which are followed in this paper, are noted here. Dravidian etyma are numbered according to the system in A Dravidian etymological dictionary, 2nd edition, and are identified by the abbreviation DEDR. The following notations are used in the interlinear glosses of the examples: *abl* - ablative; *acc* - accusative; *adnp* - adnominal participle; *cond* - conditional; *cp* - conjunctive participle; *dat* - dative; *f* - feminine; *fut* - future; *gen* - genitive; *h* - honorific; *imp* - imperative; *inf* - infinitive; *int* - interrogative; *loc* - locative; *m* - masculine; *n* - neuter; *neg* - negative; *nom* - nominative; *npst* - nonpast; *obl* - oblique; *perf* - perfect; *perm* - permissive; *pl* - plural; *pres* - present; *pst* - past; *s* - singular; *soc* - sociative; *vn* - verbal noun; *1* - first person; *2* - second person; *3* - third person. Morpheme boundaries have been approximately inserted into the examples, so no systematic significance should be attached to their placement or their absence. The transcription of the Tamil examples follows that used in Steever (1986).

The Dravidian languages distinguish just two parts of speech according to their morphology (note 1): noun and verb, both of which may occur in simple or compound forms. Noun and verb are mutually implicating terms (note 2), and are so strongly polarized in opposition to each other that their bonding has effectively inhibited the growth of new morphological and syntactic categories (note 3). Nouns are typically inflected for case, a category that characterizes the relation of a noun to its predicate within the confines of a single clause (note 4). Verbs are inflected for verbal categories such as mood and tense. Unlike case, a verbal category can establish a grammatical relation outside the bounds of a single clause. Verbs prove to be the fundamental variable in the Dravidian sentence in virtue of the fact that they combine two roles. Not only do they encode valuable grammatical information in verbal categories, but they also govern the case-assignment of the nouns they combine with. Particular attention is therefore drawn to the central role of verbs in the formation of the Dravidian sentence.

This perfectly balanced and tightly knit system of verb and noun has a direct bearing on the construction of the complex sentence. The Dravidian languages lack those parts of speech that acquaintance with a standard average European language or an introductory textbook of generative linguistics would lead us to believe are indispensable elements of the complex sentence: conjunctions (and), complementizers (that) and adverbs (during). The grammatical functions traditionally associated with these parts of speech are assumed by the morphology of nouns and verbs in the Dravidian languages. And yet the basic opposition of noun and verb may be too strong, for the morphology can be shown to impose severe restrictions on the structure and variety of the Dravidian sentence. It stands to reason, then, that exceptions to the rules of morphology may well provide the grammatical means to circumvent these restrictions. Two Dravidian verbs, *a- 'become' (DEDR 333) and *en- 'say, think' (DEDR 868), are shown to be negative absolute exceptions to the principles of case-assignment. They may be used in this capacity to get around the morphological constraints on the structure of the complex sentence.

Section 1 discusses the basic structure of simple and complex sentences, concentrating especially on the distribution of finite predicates within these structures. A rule is proposed to describe the distribution of finite and nonfinite predicates in sentences of any internal complexity. Section 2 notes that this rule raises a number of syntactic and pragmatic problems in the formation of complex sentences. These problems are overcome with the use of two exceptions to case-assignment, viz., *a- 'become' and *en- 'say, think'. Section 3 then introduces other predicates which may on occasion enter this elite class of exceptions. A preliminary semantic classification of such predicates is formulated in light of these examples. Section 4 discusses the impact of this phenomenon on the syntactic development of the Dravidian languages, particularly the northern subgroup. The possibility of reconstructing this phenomenon for Proto-Dravidian is discussed, and the hypothesis of areal convergence with Indo-Aryan debated.

1. Basic Dimensions of the Dravidian Sentence. First, a few words about Dravidian morphology are in order. It is transparent, agglutinating and predominantly suffixal. The order of morphemes in the word is: lexical root, derivational suffix and inflectional suffix. Noun and verb are morphologically distinguished according to the grammatical categories they inflectionally encode. The common Dravidian case system include eight cases: nominative, accusative, dative, genitive, locative, sociative, instrumental, and ablative (note 5). Nouns may be additionally marked for number and gender. Some languages, such as Gondi and old Tamil, can inflect predicate nominals for person, e.g., the suffix -ēṁ in the old Tamil predicate nominal pentir-ēṁ 'we women' marks agreement with a first person plural subject. Verbs mark verbal categories such as tense and mood. A verb is in formal terms finite or not, depending as it bears inflections for tense and subject-predicate agreement, or not. The finite verb appears at the end of the sentence, bringing it to a close. All other verbs in the sentence must appear in a nonfinite form: by definition, they combine with a following word, and so do not close the sentence. Nonfinite verbs come in two varieties. The first included all the forms that combine with a following noun to create relative clauses and other kinds of nominal complements. In traditional Tamil grammar they are known as peyareccam 'verbs that anticipate a noun', and include the adnominal (relative) participles. I deviate here from traditional usages in including verbal nouns under the heading of peyareccam, they differ from adnominal participle and head noun only in that the verbal noun morphologically incorporates the head along with the verb. The second includes all those verb forms that combine with a following verb. Known as viNaiyeccam in traditional terminology, they include such forms as the conjunctive participle, the infinitive and the conditional. It is important to remember that a nonfinite verb and the word it combines with may stand adjacent or be separated by intervening material, which criterion serves to distinguish them from mere compounds.

The simple sentence is a single clause consisting of a subject and a predicate. The subject is a noun-phrase that is inflected for the nominative or, in certain circumstances, the dative case. (Some sentences may in fact have locative subjects, e.g., Kannada nanna hattira hana ide 'near₂ me₁ money₃ is₄', i.e., 'I have money'; however, more research is needed to establish whether or not such 'locative subjects' do in fact have subject-coding properties, such as the ability to antecede a reflexive pronoun.) The predicate is either a finite verb or a predicate nominal. From the various combinations of subjects and predicates emerge four basic sentence types: (1) nominative subject and predicate nominal, (2) nominative subject and finite verb, (3) dative subject and predicate nominal, and (4) dative subject and finite verb. The four basic types are illustrated here with examples from Kannada and Konda.

(1) KANNADA

a avaru adhyāpakaru.
he-h-nom teacher-nom
'He (is a) teacher.'

b avaru ba-nd-arū.
he-h-nom come-pst-3h
'He came.'

- (1) KANNADA
- c avar-ige obba maga.
he-h-dat one-m son-nom
'He has a son.'
- d avar-ige tamīlu bar-at-te.
he-h-dat Tamil-nom come-pres-3sm
'He knows Tamil.'
- (2) KONDA
- a māp sena dūramti lōku.
we-nom very distance-abl people-nom 'We are people from far away.'
- b bānzaraṣa sur-t-an.
barren king-nom see-pst-3sm
'The barren king saw.'
- c aya guruy-eṅṅ budi.
that guru-dat wisdom-nom
'That guru has wisdom.'
- d lok-aṅṅ kōpam va-n-ad.
man-dat anger-nom come-npst-3sn
'That man gets angry.'

Inspection of the grammars of sister languages reveals just how widespread and basic these four sentence patterns are.

The COMPLEX sentence consists of one main clause at the extreme right boundary of the sentence, and one or more dependent clauses preceding it. Only the predicate in the main clause is finite: it occurs rightmost in the constituent structure, commands all other predicates and is itself commanded by none. The predicate in each dependent clause is a nonfinite verb, either a peyareccam or viṅaiyēccam, according to the demands of the particular structure. Examples from Tamil and Konda are used below to illustrate a variety of complex sentences, and the important role that nonfinite verbs play in their formation.

- (3) TAMIL
- a mazai pey-tu veyil aṭi-ttu vāNavil tōNR-iy-atu.
rain-nom rain-cp sun-nom beat-cp rainbow-nom appear-pst-3sn
'It rained, the sun beat down and a rainbow appeared.'
- b teyvattiN aruḷ kiṭai-kkak kaviṅṅar uṅarcciyuṅaṅ pāṭ-iN-ār.
god-gen grace get-inf poet-nom feeling-soc sing-pst-3h
'The poet sang with emotion to obtain God's grace,' or
'The poet, having obtained God's grace, sang with emotion.'
- c makaN poy coNN-āl appa aṭi-pp-ār.
son-nom lie tell-cond father-nom beat-fut-3h
'If the son lies, his father will beat him.'
- d naN mantiri va-nt-a ceyti keṭ-t-ēN.
I-nom minister-nom come-pst-adnp news hear-pst-1s
'I heard the news that the minister had come.'
- e mantiri va-nt-at-ai avaN pār-tt-āN.
minister-nom come-pst-vn-acc he-nom see-pst-3sm
'He saw that the minister had come.'

- (4) KONDA
- a or nēnd vāz-i darman kiṭa.
one day' come-cp help do-imp
'Come one day and help us.'
- b anasi uṅ-de bas-t-an.
brother-nom eat-inf sit-pst-3sm
'The elder brother sat down to eat.'
- c embe sur-t-iṅa nāru sil-ed.
where look-cond town-nom not be-pst-3n
'Wherever they looked, there was no town.'
- d rū-n-i guid-ed so-R-ad.
plough-npst-adnp field-loc go-pst-3sn
'She went to the field that they plough.'
- e aya bodel sur-t-ika idṭed.
that woman-nom see-pst-vn leave-neg-pst-3sn
'That woman did not leave alone what she saw.'

Use of the conjunctive participle is illustrated in (3a) and (4a); the infinitive in (3b) and (4b); the conditional in (3c) and (4c); the adnominal participle in (3d) and (4d); and in (3e) and (4e) the verbal noun, which fuses an adnominal participle with a pronominal head.

The distribution of finite and nonfinite predicates in the Dravidian sentence leads us to state Rule A below, a first approximation to the rule that governs the occurrence of finite and nonfinite predicates.

RULE A - THE DISTRIBUTION OF FINITE PREDICATES

- i. Each Dravidian sentence has exactly one finite predicate.
- ii. The lone finite predicate occurs rightmost in the surface constituent structure, commands all other predicates and is itself commanded by none.
- iii. All other predicates are nonfinite.

Inspection of example (3a) bears out the predictions of Rule A: the single finite verb, toNRiyatu 'it appeared', occurs in the rightmost clause in the surface constituent structure. The two remaining predicates, peytu 'raining' and atittu 'beating', are both conjunctive participles, which are nonfinite verb forms. Note that Rule A does not distinguish between finite verbs and predicate nominals: both are treated equally as finite predicates. Their distribution is identical: predicate nominals occur only where finite verbs occur, and vice versa. In essence, Rule A defines finiteness as a syntactic property; for only those predicates are considered finite which occur in the specially designated position identified in the second clause of Rule A. Finiteness is subsequently interpreted in morphological terms, according to the lexical class of the predicate. If the finite predicate is a verb, it must be marked for tense and subject-predicate agreement (note 6). If, on the other hand, it is a noun, it must be marked for the nominative case and, in some languages, for subject-predicate agreement.

Nouns can never have nonfinite forms according to the rule above. Hence, predicate nominals can never appear in dependent clauses. The third clause of Rule A properly applies only to nonfinite verb forms. This asymmetry between nouns and verbs gives rise to some problems, as we shall see below.

2. Multiple Finite Predicates in the Dravidian Sentence. Despite the ingenuity with which nonfinite verbs are used to construct complex sentences, a number of syntactic and pragmatic dilemmas quickly surface. Rule A assigns just one finite predicate to each sentence, no matter how internally complex it might be. This creates numerical and structural asymmetries in the distribution of finite and nonfinite predicates. Each sentence has just one finite predicate, but may have indefinitely many nonfinite predicates. The former appears only in main clauses, the latter only in dependent clauses. Another disparity emerges in the distribution of predicates. Predicate nominals have only finite forms; so, according to Rule A, they may never appear in a dependent clause. It follows from this restriction that only one-half of the basic clause-types, noted above, may appear in a dependent clause: those with a predicate nominal are entirely barred.

The syntactic restrictions imposed by Rule A lead to a particularly thorny pragmatic constraint. The grammar of complex sentences, as expressed in this rule, provides no means of forming direct discourse. Speaker A cannot report what speaker B said, without first transforming the finite predicate in speaker B's speech into a nonfinite form, embedded under a verb of reporting in speaker A's speech.

- (5) TAMIL
- | | | | | |
|---|-----------------------|----------|----------|--------------|
| a | nī | vā. | | |
| | you-nom | come-imp | | |
| | 'You come!' | | | |
| b | avaN | eNNai | varac | cōNNāN. |
| | he-nom | I-acc | come-inf | tell-pst-3sm |
| | 'He told me to come.' | | | |

Thus, the finite imperative verb-form vā 'come!' in (5a) must be transformed into the nonfinite infinitive vara 'to come', because the verb of reporting, cōNNāN 'he told', is the only verb that Rule A will designate as a finite predicate. By the same token, it would be virtually impossible to embed a predicate nominal under a predicate of reporting. This consequence of Rule A goes against the general belief that direct discourse is both less marked and more common than indirect discourse.

To solve these and related problems, two verbs are introduced here whose exceptional behavior allows them to circumvent in a clever, yet principled way the constraints that Rule A imposes on the formation of complex sentences in constraining the distribution of finite predicates. They are *ā- 'become' and *en- 'say, think'. They share a common property, one that is virtually unique among the verbs of the Dravidian languages. They may take as their direct objects expressions of any syntactic category and internal complexity. Furthermore, they do not impose on these objects any morphological indication of their objecthood. They may take as their objects interjections, single words, phrases, sentences, or whole chunks of discourse; they may combine with nouns and verbs with equal facility. They do not require their direct objects to undergo any morphological adjustment, such as assuming a nonfinite verb-form or bearing a case-marker. And, in fact, they cannot do so. They are, in Lakoff's terms, negative absolute exceptions to case-assignment.

In as much as the theory of case-assignment, and not the theory of finiteness, is responsible for the morphological interpretation of direct objects, the verbs *ā- 'become' and *en- 'say, think' effectively shield their direct objects from the jurisdiction of Rule A. On the other hand, since these two verbs are negative absolute exceptions to case-assignment, they need not subcategorize objects that are subject to case-assignment, viz., nouns. This frees them to combine with expressions of any syntactic category and any morphological shape. What is most relevant for our purposes, however, is that they may combine with a finite predicate.

The secret of their success in overcoming the constraints imposed by Rule A derives not just from their morphological exceptionality, but also from the fact that they are morphologically verbs. As such, they enjoy all the formal and morphological privileges of that class. When they are inflected as verbs, they may be embedded along with their direct objects in a larger syntactic pattern, according to the variety of complex sentences discussed above in Section 1. Although the inflected forms of these two verbs often appear to behave like complementizers and conjunctions, they formally belong to the class of verbs. And it is only on this assumption that we can appeal both to their exceptionality regarding case-assignment and to their ability to combine with nonfinite forms so as to explain how they can embed a finite predicate in a dependent clause, and thus overcome the constraint against multiple finite predicates in the sentence.

The following examples demonstrate the various uses to which reflexes of *en- 'say, think' are put in the formation of complex sentences with multiple finite predicates.

(6) TAMIL

- a nāN avaN nallavaN eN-Ru niNai-kkiR-eN.
I-nom he-nom good man-nom say-cp think-pres-1s
'I think that he is a good man.'
- b atai utai-tt-ay eN-Ral uNNaic cummāka vitamāttēN.
it-acc break-pst-2s say-cond you-acc alone alone leave-fut-neg-1s
'If you broke it, I won't leave you alone.'
- c avaN cettuppōNāN eN-kiR-a ceyti keṭ-ṭ-eN.
he-nom die-pst-3sm say-pres-adnp news hear-pst-1s
'I heard the news that he had died.'
- d avaN inḱē va-nt-ān eN-patu uṇmai tāN.
he-nom here come-pst-3sm say-vn-nom truth-nom indeed
'It is indeed true that he came here.'

(7) KANNADA

- a nannannu nanna pādige biṭṭu-bidi endalu jānaki.
I-acc I-gen place-dat leave-imp say-pst-3sf Janaki-nom
'Janaki said, "Leave me alone."'
- b eṁṭiārinalli dōse tinōna an-ta mane biṭṭu hora-ṭ-a.
MTR-loc dosai eat-fort say-cp house leave-cp start-pst-3sm
'He went out in order to eat dosai at the MTR.'

- (8) KONDA
 a mā buba rey-n-a i-R-an.
 my father-nom beat-npst-1s say-pst-3sm
 'My father said, "I will beat you."
 b u-n-a i-Riḡa anam sil-ed.
 eat-npst-1s say-cond food-nom not be-pst-3sn
 'There was no food to eat,' lit., 'There was no food, if you say
 "I want to eat.'"
- (9) KUVI
 a ēvasi nehasi inj-ihi nānu nam-i-ḡi.
 he-nom good man-nom say-cp I-nom believe-npst-1s
 'I believe that he is a good man.'
 b ē samomita ro mosali ānataki tir-vi man-j-i
 that time-loc one crocodile-nom wht wander-cp be-pst-2s
 inj-ihi burhaḡa vec-c-e.
 say-cp old man-acc ask-pst-3sn
 'Then the crocodile asked the old man, "Why were you wandering?"'
- (10) KOLAMI
 a ān sā-t-un en-a ar-t-an.
 I-nom go-impf-1s say-cp cry-pst-1s
 'I cried because (lit., saying) I was going away.'
 b amd anu vā en-a it-t-an.
 he-nom I-dat come-imp say-cp tell-pst-3sm
 'He told me to come.'
- (11) OLLARI
 a raytul tre tre in-ji sindup-eṭi sāy-d-ar.
 farmer-nom tre tre-onom say-cp call-cp be-fut-3sm
 'The farmer would call out, "Tre tre" (to the sheep).'
 b endrika boḡga ke-n-ed in-ji adin pakkān
 crābs-nom holes-acc do-pst-3pn say-cp it-gen side
 bokka kē-d-aṅ.
 hole-acc do-npst-3sm
 'Claiming that crabs dug the holes (in his neighbor's tank bund),
 he will dig a hole in its side.'

Reflexes of *en- 'say, think' embed predicate nominals in (6a) and (9a); ordinary finite verbs in (6b), (6c), (8a), (8b), (9b), (10a), and (11b); speech-act verb-forms in (7a), (7b) and (10b); and onomatopoeia in (11a). The verb *en- may itself appear in a number of different forms: as a finite verb in (7a) and (8a); as a conditional in (6b) and (8b); as a verbal noun in (6d); as an adnominal participle in (6c); and as a conjunctive participle in the other examples. The verb has its full lexical meaning in (7a), (8a) and (11b); and, in these examples, may be said to be "base-generated." In the other examples, however, it seems not to contribute a lexical meaning to the meaning of the whole sentence; accordingly, it may be considered to be "transformationally inserted." Despite the individual differences to be found among these sentences, all share the common property of embedding a finite predicate under the verb *en-.

Reflexes of the common Dravidian verb *ā- 'become' are also used to serve the same kinds of syntactic functions, as the set of examples overleaf demonstrates.

- (12) TAMIL
 cāmaN vānka vēṇṭum āN-āI vānku all-atu
 goods buy-inf want-fut-3sn become-cond buy-imp become-neg-vn
 kaṭaiyai viṭ-ṭu iRaṅku.
 store-acc leave-cp get down-imp
 'Unless you are going to buy the goods you want to buy, leave
 the store.'
- (13) KANNADA
 yāru avana edurige āduṭṭiralilla ād-ar-ū
 no one-nom he-obl against speak-pst perf-neg become-cond-and
 heṅsara mūlaka ī mātu kāvēriya kivi muṭṭuttittu.
 women-gen through this word K.-gen ear reach-pst perf-3sn
 'Though no one has spoken directly to him about this matter,
 word reached Kaveri's ear through women's gossip.'
- (14) PENGO
 hī-d-n-ay ac-i hī-d-a.
 give-tp-fut-2s become-cp give-tp-imp
 'If you are going to give it to me, give it.'
- (15) PARJI
 īn nāto andar pat-t-o-mē-d-a ag-i
 you-obl what confusion-nom befall-pres prf-3sn become-cp
 īn bulkak-mo-t.
 you-nom err-pres-2s
 'What is confusing you that you should make such a mistake?'

These four examples suffice to show us that reflexes of the verb *ā- 'become' can be used to embed finite predicates. In (12) the conditional form āNāI 'if become' embeds the finite predicate vēṇṭum 'be wanted', while the negative verbal noun allatu 'that which does not become', based on al- 'not become' the negative stem variant of *ā- 'become', embeds the finite imperative verb vānku 'buy!' Further examples can easily be found in the relevant grammars and texts.

These examples necessitate a revision of Rule A to accommodate the sentences above with multiple finite predicates. The number and position of finite predicates in the Dravidian sentence vary directly with the number and position of instances of these two verbs in their capacity as complementizers. They are called FINITE PREDICATE EMBEDDERS, or FPEs for short.

RULE B - THE DISTRIBUTION OF FINITE PREDICATES, REVISION

- i. The Dravidian sentence has exactly $n+1$ finite predicates, where n equals the number of FPES and 1 represents the finite predicate in the main clause.
- ii. The finite predicate in the main clause occurs highest and rightmost in the constituent structure, commands all other predicates and is itself commanded by none. Each FPE embeds a finite predicate in a dependent clause. The finite predicate associated with a FPE occurs highest and rightmost in the sentence commanded by the FPE, commands all other predicates in that sentence and is itself commanded by none.
- iii. All other predicates are nonfinite.

This rule accurately describes the distribution of finite predicates in the Dravidian sentence. Using the various forms of *a- 'become' and *en- 'say, think', a sentence can embed all of the four basic sentence types, and form direct discourse. Thus, verbs that are negative absolute exceptions to the principles of case-marking can take finite predicates as their direct objects and embed them in a dependent clause (note 7).

3. Further Exceptions to Case-Assignment. Rule B explicitly states what Dravidian linguists have tacitly understood for a long time. What has not been as clearly recognized heretofore is that many other predicates may on occasion enter the elite class of FPEs. Although the identity of these lexemes varies from one language to the next, the following examples indicate that they are largely drawn from predicates of perception, cognition, communication, and comparison. Note also that both nouns and verbs can serve as FPEs.

(16) TAMIL

- a nī eNna cen-cu iru-kka-ṇum teriyum-ā?
you-nom what do-cp be-inf-must know-fut-3sn-int
'Do you know what you must do?'
- b anta ālu rompa nallavaN mātiri iru-kk-āN
that man-nom very good man-nom likeness be-pres-3sm
pār-tt-iy-ā?
see-pst-2s-int
'Did you understand how good that man is?'
- c . . . moy-tt-a tumpi pazam cettu . . . (naRRinai 35.3)
swarm-pst-adnp bee-nom fruit-nom think like-cp
'Mistaking the swarming bees for a fruit . . .'

(17) TODA

- i mox i' xis-s-k nwī't-k-in.
this boy-nom what do-pst-3s see-fut-1s
'I will see what this boy did.'

(18) KANNADA

- a niṅge estu uṣṇa āgide gott-a?
you-dat hōw heat-nom become-pres prf-3sn knowledge-nom-int
'Do you know how hot it has become?'
- b nanu hel-t-īni kelu.
I-nom tell-pres-1s hear-imp
'Listen to what I am saying.'
- c pasarise tumbi-gaḷ kuvalayaṅgaḷ aral-du-ve
spreading bee-pl-nom water lily-pl-nom open-pres-3np
gettu . . . (pampa bhārata 5.63).
think like-cp
'Mistaking the swarming bees for a blossoming water lily . . .'

(19) TELUGU

- a āyanuku kāsta dhairyam nīwu ceppali.
he-dat little courage-nom you-nom say-may
'You might say he has little courage.'
- b cep-t-anu vinu.
tell-fut-1s hear-imp
'Listen to what I am going to tell you.'

- (20) KONDA
 a embe so-R-a ma-n-an veR-si sī-d-a.
 where go-pst-tpe be-npst-3sm tell-cp give-imp
 'Tell me where he has gone.'
 b nān unri māṭa veR-n-a ve-n-id-a?
 I-nom one word tell-npst-1s hear-npst-2s-int
 'Are you listening to what I am telling you?'
- (21) PARJI
 nāto rōn paṭ-ṭ-o-mē-d-a cūr-i ver.
 which crying befall-pres prf-3sn see-cp come-imp
 'See which woman is crying, and come (back).'

Observe that this set of examples includes FPEs that are morphologically nouns: māṭiri 'likeness, manner' in (16b) and gottu 'knowledge' in (18a) are predicates that both embed finite predicates. They appear to have entered this class of FPEs on the strength of their semantic similarity with the verbs that more commonly migrate into this class. These occasional FPEs embed either predicate nominals, as in (16a), (16c), (18c), and (19a), or finite verbs, as in the remaining examples of this set. These FPEs may themselves appear in main or dependent clauses. Although the majority of these FPEs contribute their full lexical meaning to the sentences they appear in, and to that extent fall just short of functioning as pure complementizers (note 8), certain FPEs in the Havyaka dialect of Kannada (Shastri 1971) and the Ramnad dialect of Tamil (Annamalai 1969:210) have lost their lexical meanings and assumed the role of complementizer which forms of *en- 'say, think' formerly held.

- (22) KANNADA (HAVYAKA DIALECT)
 a idu yēn āsc̣aryē hēl kēl-tu.
 this-nom what wonder-nom say-cp ask-pst-3sn
 'She asked, "What is this wonder?"'
 b tanḡu ḡst kodī hēl-i hēl-t-yu du.
 self-dat-and some give-imp say-cp say-pst-3sn that-nom
 'She said, "Give me some, too."
 c ṣḡtt hāḡ bid-ḳm-bitr ātu hēl-i
 die-andnp like fall-rfl-leave-cp become-pst-3sn say-cp
 hāḡē mā-d-tu.
 like do-pst-3sn
 'She was lying down as though she were dead.'
- (23) TAMIL (RAMNAD DIALECT)
 avaN var-r-ēN-Nu coll-i coN-N-aN̄.
 he-nom come-pres-1s-prt say-cp say-pst-3sm
 'He said he was coming.'

In both sets of examples, a verb of communication, hēl- 'say' in Havyaka Kannada and col- 'say' in Ramnad Tamil, has replaced the now obsolete forms of the verb *en- 'say', anta 'saying' in Kannada and eNRu 'saying' in Tamil (note 9), in its capacity as a complementizer of finite predicates. It must be borne in mind that the single most important syntactic property of Dravidian FPEs is not whether they have a lexical meaning, but whether they can take finite predicates as their direct objects. It is enough to show for now that such predicates may temporarily migrate into the class of

negative absolute exceptions to case-assignment, and so behave like *a- 'become' and *en- 'say, think'. Since the temporary FPEs vary from language to language, their identity must be verified anew for each language.

The verb *a- 'become' seems to be a metonym for all of the predicates of comparison that function as FPEs: old Tamil cettu 'think like', Tamil pola 'resemble' and mātiri 'likeness', old Kannada gettu 'think like'. etc. The verb *en- 'say, think', on the other hand, is a metonym for all the predicates of perception, cognition and communication that can serve as FPEs: Tamil colla 'tell', parkka 'look at', teriya 'be known', ceyti 'news'; Kannada hēlu 'say', kēlu 'listen', nōdu 'look at', gottu 'knowledge', nija 'truth, fact'; Telugu ceppu 'say', telusu 'be known', vinu 'listen', nijam 'truth'; Pengo hūr- 'see'; Konda ven 'hear', veR 'tell'; Parji cūr- 'look at'; etc. Study of texts will almost certainly bring to light additional predicates that may on occasion pass into the set of FPEs. With the aid of these temporary FPEs, many putative cases of parataxis and asyndeton, which have been reported in the Dravidian languages, may be given a more satisfactory and systematic explanation.

There is no need to revise Rule B to accommodate these other examples. As long as the grammar of each language lists the FPEs it sanctions, this rule will continue accurately to describe the distribution of finite and nonfinite predicates in the Dravidian sentence. Since this system and this rule are so pervasive and engrained in the daughter languages, it is not too outlandish to reconstruct Rule B -- or something very like to -- for the Proto-Dravidian era. Both Rule B and the two verbs *a- 'become' and *en- 'say, think', in their capacities as complementizers, seem to belong to the common Dravidian heritage.

4. Diffusion, Convergence and Syntactic Evolution. Up to this point, all mention of the North Dravidian languages has been studiously avoided. The syntactic patterns in this subgroup deviate markedly from those discussed in the earlier sections of this paper. Yet the phenomenon of temporary FPEs may be able to cast new light on one facet of the syntactic evolution of the northern subgroup. These languages seem to have developed new syntactic patterns by admitting into the set of FPEs virtually any predicate that subcategorizes a sentential complement. The influx of so many new members into this set would have cost it its exceptionality, which would have lead in turn to a fundamental reorganization of sentence structure around the dimension of finiteness. Consider the following Kurux examples.

- (24) KURUX
 a ās barʔon bācas.
 he-nom come-fut-1s say-pst-3sm
 'He said, "I will come."
 b ēn asra nan-d-an enghae sanngias barʔos.
 I-nom desire do-pres-1s I-gen friend-nom come-fut-3s
 'I hope that my friend will come.'

In both examples, the finite verb of the main clause combines directly with a dependent clause containing a finite verb, without the intervention of a

FPE acting as a complementizer. Note that example (24b) positions the dependent clause after the main clause in imitation of a common Indo-Aryan syntactic pattern. Yet, if the syntactic influence were exerted on North Dravidian from Indo-Aryan, the changes exploited the Dravidian device of conjunctive-participle postposing to do so (note 10). The loss of "complementizers" in this subgroup is not the result of the diffusion of syntactic patterns from one language family to another, but the result of carrying to its logical end the expansion of the class of FPEs until it has lost its status of exceptionality.

This instance of syntactic development in North Dravidian may be viewed as an argument against an overly simple theory of the diffusion of grammatical features. Even though this theory has some currency in South Asian linguistics, it has been formulated only at relatively superficial levels of linguistic structure, often with fragmentary data and cursory analysis. What Sapir (1921:205-6) says about diffusion bears repeating here:

Attempts have sometimes been made to explain the distribution of these fundamental structural features by the theory of diffusion . . . An examination of such cases, however, invariably reveals the significant fact that they are but superficial additions on the morphological kernel of the language.

What is said here about morphological drift may be equally well said about syntactic development in Dravidian, not the least because these languages extensively utilize their morphology to encode grammatical relations. If Indo-Aryan has exerted an influence on the development of Dravidian syntax, it has done so at a remove. These changes have been mediated, however, by Dravidian grammatical processes operating on Dravidian grammatical structures. As the expansion of the set of FPEs shows, the actual developments have followed a course charted by Dravidian forms and rules.

This brief discussion shows us how ingeniously the Dravidian languages employ their morphological and lexical resources to create complex syntactic structures. Two sets of devices have figured prominently in the discussion. Nonfinite verbs are used widely to form dependent clauses, which are ultimately linked with the finite predicate in the main clause of the sentence. FPEs are used to embed finite predicates in dependent clauses. They owe their ability to do this to the fact that they are negative absolute exceptions to case-assignment, and so may combine with a direct object of any category without first having it undergo a morphological change to mark objecthood or subordination. Nonfinite verbs are less marked than FPEs: while all verbs may have nonfinite forms, not all verbs can readily be exceptions to the principles of case-assignment. The syntactic behavior of FPEs presupposes the syntactic behavior of ordinary verbs, as well. While neither morphology nor lexicon can shoulder the entire burden of accounting for syntactic concepts such as constituency and dependency, they nevertheless contribute significantly to the grammar of complex sentences in Dravidian.

Further research may well corroborate the initial observation that in the Dravidian languages morphology encodes grammatical relations that would be encoded by syntactic means in other languages. This study may help to bring into greater relief the principles that govern the interaction of morphology and syntax as a function of a language's typological character. Such principles would then contribute to the study of language typology and universals. It is perhaps not too much to expect that genetically unrelated, but typologically similar languages, such as Sinhala, would resort to devices similar to those found in Dravidian to construct complex sentences. The prerequisites for such a language appear to be a highly limited number of parts of speech, the significant use of finiteness in constituent structure, an elaborate morphology, and determination of case-assignment by the verb.

NOTES

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1. See Steever (1986) for a discussion of the typological features of the Dravidian languages. Although individual grammars may enumerate many more parts of speech, they can generally be resolved into various combinations of nouns and verbs. So-called indeclinables may prove to be defective nouns or verbs, and assigned to one category or the other on a case-by-case basis. There is also a set of clitic particles, e.g., * \bar{o} 'or, whether', which play an important role in the syntax of complex sentences (see also note 7). Clitics are more marked than free words because they presuppose the existence of the words to which they are cliticized, although the converse is not necessarily true.
2. The opposition of verb and noun constitutes the logically minimal system of parts of speech. No language can have only one part of speech, just lexical bases that are indifferently inflected as verbs or nouns. As Sapir (1921:119) suggests, the two must be defined in opposition to each other.
3. New categories, innovated from within or borrowed from outside Dravidian, are drawn into the orbit of either nouns or verbs. For example, the Sanskrit privative prefix a-, ava- is reanalyzed in Tamil as the noun avam 'emptiness, void, nullity', with the stem variants ava- and a-. See Steever 1986 for a fuller discussion.
4. Case is assumed to be different from, though correlated with, thematic role. Furthermore, the genitive case does not easily fit this heuristic characterization of case since in Dravidian it is adnominal. Case is commonly held to describe a relation between a noun and a verb, but the genitive relates two nouns. It might be characterized -- unsatisfactorily, I think -- as a case that relates one noun to a verb through the means of another noun.

Furthermore, this jury-rig definition applies more properly to the abstract, rather than the localistic, cases. The latter may be said more properly to relate a noun to a clause or sentence as a whole, rather than just to the verb.

5. The first four cases are considered to be abstract or nonlocalistic; the second four, to be concrete or localistic. The shape of the first four is relatively easy to reconstruct to the protolanguage; that of the second four is not. The concrete cases are often supplemented by and, ultimately replaced by, postpositions derived from independent nouns or verbs in nonfinite forms.

6. A language such as Malayalam lacks personal endings to mark subject-predicate agreement on verbs. Therefore, it morphologically interprets the syntactic property of finiteness in a different way.

7. Besides nonfinite verb forms and FPEs belonging to the class of verbs, a number of postclitic particles are also used to form complex sentences. Clitics such as *-o 'whether, or', *e- 'even, and', Kannada -alla 'isn't it?', and Telugu gādā 'isn't it?'. Included among these sentence types are dubitative, correlative and appositive constructions. For the purpose of describing the distribution of finite predicates in the Dravidian sentence, these clitics are to be treated on an equal footing with the FPEs in Rule B. No new category of finite predicate embedders needs to be devised; we need only to expand the set of FPEs to include these clitics. (See note 9, where the Tamil verb eN- 'say, think' becomes the postclitic particle -Nu 'ibid' without losing its status as a member of the set of FPEs.)

8. What is essential in these examples with reflexes of *en- 'say, think' is not whether they have a full lexical meaning; for in some cases they do, in others, they do not. What is germane is that they may combine with finite predicates, embedding them in dependent clauses. It must be borne in mind that the notion of complementizer, as it applied in Dravidian, is an epiphenomenal function, not a basic formal category realized in a particular part of speech.

9. The form -Nu is a clitic particle that is formed through the contraction of the conjunctive participle eN-Ru 'saying'. In the present example, it could be analyzed either as a clitic particle that embeds a finite predicate (note 7), or as a boundary marker that is syncategorematically introduced into the structure of a matrix-complement sentence.

10. Though example (24b) exhibits a word-order that is typical of modern Indo-Aryan, not Dravidian, it can be shown (Steever 1987) that such constructions developed from native Dravidian constructions with the help of a common rule that permits the postposing of certain dependent clauses rightward over the finite verb. Examples from Tamil and Kannada are shown overleaf, in which a dependent clause with a conjunctive participle is postposed rightward over the finite verb.

- TAMIL
- (a) avaN ōti va-nt-āN.
he-nom run-cp come-pst-3sm
'He came running.'
- (a') avaN va-nt-āN ōti.
he-nom come-pst-3sm run-cp
'He came running.'
- (b) avaN varu-kiR-ēN eN-Ru coN-N-āN.
he-nom come-pres-ls say-cp tell-pst-3sm
'He said he was coming.'
- (b') avaN coN-N-āN varu-kiR-ēN eN-Ru.
he-nom tell-pst-3sm come-pres-ls say-cp
'He said he was coming.'
- KANNADA
- (c) avaḷu nagutta māṭād-id-alu.
she-nom laugh-cp speak-pst-3sf
'She spoke with a laugh (lit., laughing).'
- (c') avaḷu māṭādi-id-alu nagutta.
she-nom speak-pst-3sf laugh-cp
'She spoke with a laugh.'

It is easy to see that the rule which is responsible for this alternation could be exploited in the production of the now dominant word-order found in the Kurux examples in (24).

See Hock (1982, 1984) for arguments in favor of linguistic convergence which are based on crosslinguistic influence mediated through the grammatical structures of the different languages. Although I do not necessarily agree with what is said about the historical development of the Dravidian languages in particular, the methodology is sound in that it insists on relating linguistic changes to linguistic structures, whatever the ultimate motivation for those changes may be.

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REFLEXIVES AND RECIPROCALLS IN DRAVIDIAN

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Reflexives and reciprocals in Dravidian languages are manifested by either a verbal reflexive (VR) or by a reduplicated structure or by both.1 Amritavalli (1984) claims that the verbal reflexive 'anaphorizes' the anaphor in some cases. In this paper, we shall show that both - the reflexive and reciprocal in Dravidian languages - can be accounted for by a unitary process of case copying and that there is no need to include a rule which anaphorizes the anaphor in the Grammar.

1.1 The aim of this paper is to argue for an analysis which provides a unitary solution to account for reflexive and reciprocals in Dravidian without adding any new rules to the Grammar. Let us consider sentences such as (1) and (2) from Kannada (VR stands for verbal reflexive).

- (1) nānu nannannu hoḍedu-koṇ-de
I I + ACC hit VR AUX
'I hit myself.'
- (2) rām { avanannu } hoḍedu-koṇ-da
Ram { he + ACC } hit VR AUX
{ tannannu2 }
{ he + ACC }
'Ram hit himself.' (Amritavalli, 1984)

Notice that there is no overt reflexive pronoun as such in these sentences and there is a verbal reflexive kon/kol occurring in the verb. The question that arises is : How is the coreference established in such sentences? According to Amritavalli (1984:3), it is the verbal reflexive kon/kol that 'anaphorizes' pronouns in some way exempting them from the requirement of 'Disjoint Reference'. Her claim is that anaphors in Kannada and other Dravidian languages and also in English have a 'bipartite structure' : one is a simple pronoun and the other, the anaphoric part, is due to a process which fills in 'values for an abstract agreement matrix AG' (ibid:1).3 That

is, in the verbal reflexive kon/kol anaphorization process, only an abstract feature matrix is copied to the second identical occurrence of the noun phrase and Amritavalli claims that an abstract anaphorization rule should be included in the grammar. Such an anaphorization rule in her approach, however, is not required in those cases where an anaphor occurs in reduplicated form in sentences such as (3) containing a dative subject and in sentences, such as (4) containing reciprocals.

Ka (3) mohan-ige tann-a mēle tana-ge nambike illa
Mohan DAT self GEN on self DAT trust is not

anta gōpāl hēḷidanu
that Gopal said

'Gopal said that Mohan does not hit himself.'

(Amritavalli, 1984)

Ka (4) avaru-ḥ abbru-anna obbaru-ḥ hodedaru⁴
they someone+ACC someone hit⁴
'They hit each other.'

Notice that the second part of the anaphor agrees with the subject (the dative in sentence (3) and ḥ in sentence (4)). According to Amritavalli, it is the reduplication of the anaphor together with the case agreement that is crucial for establishing coreference in sentences such as (3) and (4).

Subbarao and Saxena (1984) propose that reflexivization in Dravidian languages is manifested by a bound anaphor and the verbal reflexive kon/kol. The constitution of the bound pronoun, they argue, is a reduplicated form consisting of a pronominal object and a pronominal copy of the subject. They argued that the bound anaphor occurs in a reduplicated form in all the constructions containing a bound anaphor, namely, the reflexive sentences containing the verbal reflexive kon/kol, the dative subject construction and the reciprocals.⁵

We shall show that Subbarao and Saxena's analysis which provides a unitary explanation to account for reflexives and reciprocals should be preferred to Amritavalli's analysis which gives two different explanations for reflexives and reciprocals and also requires an additional anaphorization rule to be included in the grammar. Data in this paper will be drawn mainly from Telugu. Crucial data divergent from Telugu will be provided from Kannada, Tamil and Malayalam to substantiate our analysis. Section 1.2 of this paper deals with reflexives. Section 1.3 deals with reciprocals. And section 1.4 evaluates the proposals concerning reflexives and reciprocals with a view to choosing an explanatorily adequate analysis.

1.2 It is important to mention at the outset that there is no reflexive pronoun as such in Dravidian. The reflexive meaning is imparted either by a

reduplicated bound anaphor together with a verbal reflexive such as kon/kol or, solely by a reduplicated bound anaphor in the dative subject construction. Consider the following sentences. (The bound anaphor and the verbal reflexive are underscored).

- Te (5) nannu nēnu koṭṭu - kon- ānu
 I +ACC I hit VR AUX
 'I hit myself.'
- Te (6) wāḍu tanani tanu koṭṭu - kon -Ķādu
 he he +ACC he hit VR AUX
 'He hit himself.'
- Ka (7) nannannu nānu hoḍedu - kon - de
 I +ACC I hit VR AUX
 'I hit myself.'
- Ka (8) rām avanannu avanu hoḍedu - kon - da
 Ram he + ACC he hit VR AUX
 'Ram hit himself.'
- Ta (9) ennai nān aḍittī - kon - dēn
 I+ACC I hit VR AUX
 'I hit himself.'
- Ta (10) kamala avalai avala aḍittī - kon - dāḷ
 Kamala she+ACC she hit VR AUX
 'Kamala hit herself.'
- Ma (11) ñān yenne tann-e6 aḍiccu
 I I+ACC I+ EMPH hit
 'I hit myself.'
- Ma (12) rām tanne tann-e aḍiccu
 Ram he+ACC he+EMPH hit
 'Ram hit himself.'

A close look at the data reveals that Telugu, Kannada, Tamil and Malayalam have a reduplicated occurrence of the pronoun and all the languages except Malayalam have a verbal reflexive kon/kol. Further, in Malayalam the second occurrence of the reduplicated pronoun in all three persons is tanne.

According to the Base approach for reflexives proposed in Subbarao and Saxena (1984), a remote representation of sentences (5) and (6) is as in (5.a) and (6.a) respectively.

(5.a) nēnu nannu koṭṭ + [SELF]7 + AUX
 I I+ACC hit

(6.a) kamala tana + ni koṭṭ + [SELF] + AUX
 Kamala she ACC hit

The feature [SELF] is realized as the verbal reflexive kon. In (5.a) nēnu which is the logical subject, is copied into the object position to the right of the object pronoun, and then the subject is optionally deleted.

In sentence (6.a) tanu, a third person bound pronominal form of the subject, is copied into the object position to the right of the object pronoun. It should be emphasized here that the subject is normally deleted only in first and second persons, as they have unique reference but not in third person.

Notice further that the second occurrence of the reduplicated bound anaphor can be optionally deleted yielding a sentence such as (13) from sentence (5) in Telugu. Such optional deletion is possible because the verbal reflexive imparts the reflexive meaning. As we shall see such a deletion is not possible in sentences with the dative subject where a verbal reflexive is not present.

Te (13) nannu kottu - konn - ānu
 I +ACC hit' VR AUX

Evidence in support of our claim that the subject in the first and the second persons is deleted comes from sentences in which the subject is followed by markers such as aitē 'as for', kābaṭṭi 'because', mātram 'as for' and e, emphatic marker.

Te (14) nēnu aitē nannu nēnu progūḍu- kō- lēnu
 I as for I +ACC I praise VR cannot
 'As for me, I cannot praise myself.'

Te (15) mīru kābaṭṭi mimmalni mīru wimarsincu - kō
 you because you +ACC you criticize VR

galugu tunnāru
 are able to

'Because it is you, you can criticize yourself.'

Let us now deal with Amritavalli's analysis of reflexives. She considers sentences such as (1) and (2) from Kannada (repeated here for convenience) which are synonymous to sentences (7) and (8) above.

- Ka (1) $\bar{n}\bar{a}nu$ $nannannu$ $ho\dot{d}edu$ - \underline{kon} - de
 I I + ACC hit VR AUX
 'I hit myself.'
- Ka (2) $\bar{r}\bar{a}m$ $\{ \begin{array}{l} \bar{a}vanannu \\ he +ACC \\ \\ tannannu \\ he +ACC \end{array} \}$ $ho\dot{d}edu$ - \underline{kon} - da
 Ram hit VR AUX
 'Ram hit himself.'

According to Amritavalli, $\underline{kon}/\underline{kol}$, the verbal reflexive, "anaphorizes" pronouns in some way, exempting them from the requirement of Disjoint Reference' (1984:3) and 'the accusative pronoun $nannannu$ is the realization of a feature matrix which is copied from the matrix of the subject' (1984:25). Such 'copying' of the feature values from an antecedent NP such as $\bar{n}\bar{a}nu$ 'I' to the second identical NP, $nannannu$ 'I+ACC', according to Amritavalli, is the process of anaphorization which in fact is triggered by the verbal reflexive $\underline{kon}/\underline{kol}$. The point which we intend to draw attention to is that under this analysis, only an abstract feature matrix is copied, but not any specific case marking. We shall show later that this abstract copying as opposed to copying of an actual case marking crucially affects the choice of an explanatory adequate analysis.

Now, sentences such as (1) and (2) correspond to Telugu sentences (16) and (17).

- Te (16) $\bar{n}\bar{e}nu$ $nannu$ $ko\dot{t}tu$ - \underline{konn} - $\bar{a}nu$
 I I +ACC hit VR AUX
 'I hit myself.'

- Te (17) $\bar{w}\bar{a}du$ $\bar{t}anani$ $ko\dot{t}tu$ - \underline{konn} - $\bar{a}du$
 he he +ACC hit VR AUX
 'He hit himself.'

Notice that sentence (16) is derived from (5) by means of a rule which moves the second part of the bound pronoun to sentence initial position. Thus, the word order in sentence (1) from Kannada and (16) from Telugu, according to our analysis, is marked as opposed to the unmarked word order in sentences such as (5) from Telugu, (7) from Kannada, and (9) from Tamil.

It should be pointed out that in our analysis the repeated occurrence of the identical pronoun $nannu$ $\bar{n}\bar{e}nu$ 'I+ACC - I', $\bar{t}anani$ $\bar{t}anu$ 'he+ACC - he' in Telugu has two characteristics which deserve to be mentioned:

(i) These bound pronouns are not reflexive pronouns. They have a reduplicated structure and the second part of the bound pronoun is derived by means of a copying rule which copies a pronominal form of the subject.

(ii) By virtue of being a copy of the subject, the second bound pronoun carries the case marking of the subject. That is, the case of the subject is copied onto the second part of the bound pronoun.

Evidence in support of our claim that the case marking of the subject is copied onto the bound pronoun comes from the dative subject construction. Consider sentences (18) and (19) from Telugu.

Te (18) nāmīda nāku kōpam waccindi
 I +on I+DAT anger came
 'I got angry on myself.'

Te (19) kamala ki tanamīda tanaki kōpam waccindi
 Kamala DAT she+on she+DAT anger came
 'Kamala got angry on herself.'

According to our analysis, nāku 'I+DAT' in sentence (18) is a copy of the subject nāku which has the dative case marking and nāku, the subject, is subsequently deleted⁹. In sentence (19) tanaki 'she+DAT' is a pronominal copy of kamala which therefore has a dative case marking. This agreement in case marking between the pronoun and its subject NP clearly supports our hypothesis that case copying takes place.

Notice further that the verbal reflexive does not occur in sentences with a dative subject in Telugu, Tamil and Kannada. In such sentences the occurrence of the nonreduplicated pronoun yields ungrammatical sentences in the intended sense. Such ungrammaticality is due to disjoint reference of the pronoun as the verbal reflexive and/or the reduplicated structure which imparts reflexive meaning are not present in the sentence.

The absence of the verbal reflexive in sentences with a dative subject is due to the fact that the predicates that take the dative subject are all intransitive and therefore the coreferent NP in such cases is not syntactically in the direct object relation. The verbal reflexive, according to our analysis, occurs only in those cases where the coreferent NP is in direct object relation (grammatical) with the predicate.

It is worth digressing here to discuss a couple of sentences from Telugu in which it appears that kon, the verbal reflexive, occurs in structures which look like they are dative subject construction. The following sentences are illustrative.

Te (21) wādiki pāpam cuṭṭu - kon - dilō
 he+DAT sin encircle VR AUX
 'Sin encircled on him.'

Te (22) wādiki bhayam paṭṭu - kon - di
 he+DAT fear catch VR AUX
 'Fear caught hold of him.'

However, we believe that sentences (21) and (22) are not true dative subject constructions. Our reason is as follows.

Dative subject structures do not permit a conjunctive participial construction in which the grammatical subject, such as kōpam 'anger' in sentence (18) above can be the subject of both clauses, and where the experiencer is the object of the matrix sentence. This is shown by the ungrammaticality of sentences (23) and (24).

Te (23) { *wādini
 he+ACC } kōpam wacci tinēstundi
 anger having come is eating up
 { *wadiki
 he+DAT }
 'Anger, having come to him, is eating him up.'

Te (24) { *wādini
 he+ACC } noppi wacci citrawadha cēstundi
 pain having come killing is doing
 { *wadiki
 he+DAT }
 'Pain, having come to him, is almost killing him.'

On the other hand, sentences such as (21) and (22) can occur in a conjunctive participial construction if the logical subject occurs in the accusative and not in the dative case as in sentence (25) and (26) below.

Te (25) { wādini
 he+ACC } pāpam cuṭṭu koni pīdūstundi
 sin encircle VR is bothering
 { *wadiki
 he+DAT }
 'Sin having encircle him, is bothering him.'

Te (26) wādini bhayam paṭṭu koni picciwādni cēstundi
 he+ACC fear catch VR crazy is making
 'Fear, having caught hold of him, is making him crazy.'

The accusative case marking, in sentences (25) and (26) is permissible because the NP he is in direct object relation with the matrix predicate.

Kannada and Tamil too do not permit kon/kol, the verbal reflexive, in the dative subject construction. Sentence (27) from Tamil is illustrative.

Ta (27) avalikkē jaladōṣam { puḍittā wittidā }
 he +ACC cold catch drop+AUX
 { *puḍittā kondadā }
 catch VR+AUX
 'He caught a cold.'

1.3 We shall now consider the analysis of reciprocals in Dravidian. Let us consider the following sentences from Telugu and Kannada (the reciprocal is underscored).

Te (28) wāllu-ō okalla ni okallu-ō koṭṭu-konn-āru
 they someone+ACC someone hit VR AUX
 'They hit each other.'

Ka (29) avaru-ō obbar-anna obbaru-ō hoḍedaru
 they someone+ACC someone hit -PST
 'They hit each other.' (Amritavalli, 1984)

As can be seen, the reciprocal contains a reduplicated structure, the first part containing the usual object case marking, which in fact is a copy of the nominative case marking of the subject.

Note that the VR is obligatory in Telugu reciprocal constructions whereas in Kannada, Tamil and Malayalam, it does not occur at all.

Evidence in support of the claim that the case marking of the second part of the reciprocal contains the case of the subject was provided by Amritavalli (1984) from the dative subject constructions in Kannada and Malayalam. The following sentences are illustrative (the dative is underscored).

Te (30) wāḷḷaki okaḷḷu anṭēll okaḷḷa ki padadu
 they+DAT someone say+COND someone DAT does not suit
 'They do not like each other.'

Ka (31) avar-ige obbar-anna kandre obbar-ige āguvadilla
 they DAT someone ACC someone DAT happenNEG
 'They do not like each other.'¹² (Amritavalli, 1984)

Notice that the subject contains the dative case marking and so does the second part of the reciprocal.

Thus, according to Amritavalli, there are '...two major instances of anaphorization in Dravidian: anaphorization by Case Agreement and kollu-anaphorization. The former process is illustrated in the Kannada reciprocal.... The latter process (i.e. kollu anaphorization) is illustrated by data by reflexivization of tānu and the personal pronouns' (1984:18).

It should be pointed out that under Amritavalli's analysis, the reduplicated structure of the reciprocal is similar in nature to the reduplicated structure of the reflexive in the dative subject construction. Although Amritavalli does not explicitly state, it is this reduplication together with the case agreement of the anaphor with the subject that prevents disjoint reference in reflexive sentences containing dative subjects and reciprocals.

Though Subbarao and Saxena (1984) do not deal with reciprocals, an analysis of reciprocals consistent with the analysis of reflexives proposed therein, would be as follows: Reciprocals in Dravidian, just as the reflexive constructions, have a reduplicated structure. The second part of the reciprocal just as the second part of the bound anaphor carries the case marking of the subject and this case marking is copied onto it by a case copying process.

To summarize, under Amritavalli's analysis, the reciprocal contains a bipartite structure:

a reduplicated structure + an agreement matrix (case)

Under Subbarao and Saxena's analysis, the reciprocal contains a structure which is as follows:

a reduplicated structure + a case copy of the subject¹³

Under Subbarao and Saxena's analysis, all the subtypes of reflexives and reciprocals are treated identically; that is, they all contain a reduplicated structure and case copying takes place in all of them. Amritavalli posits a case agreement marker only for dative subject reflexives and reciprocals. In sentences with a reflexive with a nominative subject, kollu-anaphorization takes place which 'somehow' prevents disjoint reference of the bound pronoun and the bound pronoun is the 'realization of a feature matrix which is COPIED from the matrix of the subject' [emphasis added] (Amritavalli, 1984:25).

1.4 In this section, we shall attempt to evaluate the proposals of Amritavalli (1984) and Subbarao and Saxena (1984) with a view to choosing a descriptively and explanatorily adequate analysis. In view of the

similarities between the structures of reflexives and reciprocals, an analysis which provides a homogeneous solution to account for the facts should be preferred to one which treats these as unrelated or partially related phenomena. Moreover, we will prefer an analysis which can capture most of the similarities that exist in all the four Dravidian languages under consideration.

1.4.1 Let us first consider the case of the identical occurrence of the bound pronoun.

Under Subbarao and Saxena's analysis, this pronoun always is in a reduplicated form whether the subject is in the nominative or in the dative case. The case marking of the subject is invariably copied onto the second part of the reduplicated structure by a copying process.

Under Amritavalli's analysis, in sentences with a nominative subject, the identical NP is a simple pronoun with object case marking only. The reduplicated structure occurs only in sentences with a dative subject where the verbal reflexive does not occur. Only in such cases, the pronoun is reduplicated to avoid disjoint reference. Thus, the occurrence or nonoccurrence of reduplicated structures crucially depends on the absence or presence of the verbal reflexive. Thus, there are two different processes of anaphorization in Amritavalli's analysis:

(i) The kollu-anaphorization process; and

(ii) Anaphorization by case agreement.

In the kollu-anaphorization process, only an abstract feature matrix is copied onto the bound pronoun from the matrix of the subject, whereas in the dative subject construction, anaphorization by real case agreement with the subject takes place. Notice that there is no motivation to include a rule which copies an abstract case marking only in some cases as opposed to a rule which actually copies the case marking.

In Subbarao and Saxena's analysis, reduplicated structures are posited for both the nominative and the dative subject constructions, thus treating these two constructions similarly. Further, the second part of the bound anaphor always carries the case marking of the subject, irrespective of whether it is in the nominative or the dative case. Moreover, in Subbarao and Saxena's analysis, the problem of disjoint reference of the bound pronoun does not arise, because of the reduplicated structure posited irrespective of the fact whether the verbal reflexive occurs or not.

Further, Amritavalli's analysis treats differently sentences with a nominative subject in Telugu, Kannada and Tamil on one hand and Malayalam on the other, the former three languages having nonreduplicated pronouns (see

sentences (1) and (2) above) and the latter having structures which are reduplicated (see sentences (11) and (12)). Thus, under Amritavalli's analysis, Malayalam differs from the other three Dravidian languages in two aspects:

(i) The presence of reduplicated structures in sentences with a nominative subject, and

(ii) The absence of the verbal reflexive.

Under Subbarao and Saxena's analysis, Malayalam differs from Telugu, Tamil and Kannada only with regard to one aspect, namely, the absence of the verbal reflexive.

It should however be mentioned that both analyses would have to treat the second occurrence of the reduplicated structure, namely, tanne in Malayalam, as an exception with regard to case agreement or copying.

Though not explicitly stated, it is implicit in Amritavalli's analysis that:

(i) in the three Dravidian languages except Malayalam a nonduplicated bound pronoun occurs when the verbal reflexive is present, and

(ii) in such cases only, abstract case agreement takes place.

That is, there is no single unified process of copying of case. Further, case agreement is sensitive to the presence or absence of the verbal reflexive in Amritavalli's analysis whereas it is not so in Subbarao and Saxena's analysis.

1.4.2 The crucial question that arises now is this: Is there any evidence to show that there is a single process of case agreement or copying which does not depend on the presence or absence of the verbal reflexive? It appears that there is.

Independent evidence for assuming a single process of case agreement or copying is found in the reciprocal constructions. As mentioned earlier, in all the four languages, the second part of the reciprocal carries the case marking of the subject. However, the presence of the verbal reflexive is obligatory only in Telugu in reciprocal constructions containing a nominative subject. The verbal reflexive does not occur in the dative subject construction of Telugu or any of the other three languages.

Both Amritavalli's and Subbarao's analyses can account for case marking by either an anaphorization process or case copying process respectively.

However, if we extend Amritavalli's analysis to the Telugu reciprocal

constructions, a problem arises with regard to the nature of anaphorization in such constructions, because the reciprocal is a reduplicated structure and the verbal reflexive also occurs. We must therefore ask which of the following alternatives we should choose to account for this situation?

- (i) Anaphorization by Case Agreement
- (ii) Anaphorization due to the verbal reflexive which only copies an abstract case agreement marker
- (iii) Anaphorization by Case Agreement as well as due to the verbal reflexive.

Choosing alternative (i) would imply that the verbal reflexive, though overtly present, has no role in the anaphorization process. Choosing alternative (ii) would yield the expected result. Choosing alternative (iii) would imply that actual copying does not depend on the presence or absence of the verbal reflexive or reduplicated structures.

Subbarao and Saxena's analysis, on the other hand, does not encounter this problem because (i) reduplicated structures are posited in reflexives as well as reciprocals and (ii) case copying takes place in both the constructions whether the subject is in the nominative or dative.

To conclude, the above discussion shows that positing reduplicated structures for reflexives as well as reciprocals and including a case copying process in Dravidian languages (except in one single case in Malayalam) would adequately account for the facts.

NOTES

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2 tan in tannannu 'he + ACC' is a bound anaphor. A bound anaphor is one which cannot occur in a sentence unless it has an antecedent. The ungrammaticality of sentence (ii) in contrast to sentence (i) is illustrative.

Te (i) kamala \bar{i} sangati ceppi tanu skūl ki
 Kamala this news having said she(bound) school to
 wellipōyindi
 is gone
 'Having told this news, Kamala went to school.'

Te (ii) *tanu \bar{i} sangati ceppi kamala skūl ki
 she(bound) this news having said Kamala school
 wellipōyindi
 is gone

As we shall see later, reduplicated occurrences of a pronoun too should be treated as bound anaphors as they can occur if and only if they have an antecedent.

3 AG, according to Amritavalli, is a 'label for a schematic complex of unspecified features whose values must be filled in by a rule that refers to some NP in the sentences' (Amritavalli, 1984:12).

4 Notice that there is no verbal reflexive present in sentences (3) and (4).

5 Subbarao and Saxena (1984) does not deal with reciprocal constructions. In Dravidian languages reciprocals too have a reduplicated structure.

6 EMPH stands for emphatic marker. Mohanan (1981) and Amritavalli (1984) claim that the repeated occurrence of tanne is in the accusative case. We treat e as an emphatic marker.

7 According to the Base approach [SELF] should be posited in the base to indicate the reflexive meaning. Since this proposal is made on the basis of data from a wide range of languages, it does not have the inherent defects of an analysis such as Helke's (Helke, 1979) which is based on the data from English alone. For further details concerning the Base approach see Subbarao (1983) and Saxena (1984).

8 We treat tan as a bound pronoun and not as a reflexive pronoun and so does Amritavalli (1984).

9 In order to prove our contention that the subject is deleted in the first and second persons, we earlier provided evidence from sentences such as (9) and (10) having aitē 'as for'.

10 We are thankful to Professor Bh. Krishnamurti for pointing out these sentences.

11 antē, the conditional form of the verb say, in Telugu, is labelled as Emotive Predicate Linker (EPL) which occurs with the logical object in sentences such as (iii) and (iv) containing psychological predicates.

Te (iii) nāku sinēmālu antē istam
I+DAT movies EPL liking
'I like movies.'

Te (iv) kamala ki sinēmā ~~aktar~~ antē cirāku
Kamala DAT movie actors EPL irritation
'Kamala can not stand movie actors.'

12 Amritavalli (1984) rightly points out that a postposition may occur in between the two parts of the reciprocal. The following sentence is illustrative.

Ka (v) avar-ige obbar-amēle obbar-ige nambige illa
they-DAT someone-on someone-DAT trust not
'They don't trust each other.'

Lehman (1985) too presents similar data from Tamil. However, in Telugu even a verb in the conditional form or the conjunctive participial (CP) form can occur in between the two parts of the reciprocal. For example,

Te (vi) wālla-ki okalla-ni cūsi okallaki
they+DAT someone+ACC having seen someone+DAT

ōrwalēnitanam ekkuwa
intolerance too much
'They are jealous of each other.'

13 It is important to mention here that it is only the case marker and nothing else is copied onto the second part of the reciprocal as illustrated in the following sentence.

Te (vii) kamala kī sīta kī okalla-kī okalla ki paḍadu
Kamala DAT Sita DAT someone DAT someoneDAT suitNEG
'Kamala and Sita do not like each other.'

Notice that conjunction in Telugu is manifested by lengthening the final vowel of each of the conjuncts. This length cannot be copied onto the dative of the second part of the reciprocal. However, both the case markings of the reciprocal can be lengthened.

Te (viii) kamala kī sīta kī okalla kī okalla kī paḍadu
Kamal DAT Sita DAT someone DAT someone DAT suit NEG

It is interesting to note that the predicate pad 'suit' not only takes a dative with a subject but also with an object.

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The Pañcatantra and Aesop's Fables: A comparison of rhetorical structure in classical Indian and western literature¹

Sarah Tsiang and Albert Watanabe

In this paper the rhetorical structure of fables in the Sanskrit Pañcatantra and Greek fables of Aesop are compared with regard to nominal vs. verbal style, circular vs. linear organization and cumulative vs. descending manner of presentation. We observe that the rhetorical structure of Sanskrit and Greek texts in this genre differ significantly in these three areas. Our conclusions based on the analysis of classical texts support the conclusions of studies in which modern texts from these two traditions have been compared.

1.0 Introduction

Recent sociolinguistic studies have shown that there are considerable differences in the organization of discourse in texts written in the literary traditions of different cultures (Kaplan 1966, Clyne 1982, Pandharipande 1982, Y. Kachru 1983). While current research is primarily based on the analysis of modern texts, we propose to investigate discourse organization in texts written in two classical Indo-European languages: Sanskrit and Greek. The two traditions differ even in respect to what indigenous theories of rhetoric argue should be emphasized in a text. Thus the observation in (1) from Daṇḍin's Kāvyaśāstra contrasts sharply with the advice of Quintilian in (2):

- (1) ojaḥ samśasabhūyastvam etad gadyasya jīvitam (1.80)
'The frequent use of compounds [gives] power to prose; it [is its] life-force.'
- (2) Verbo sensum cludere multo, si compositio patiat, optimum est; in verbis enim sermonis vis est. (Institutio oratoria 9.4.26)
'If the arrangement [of words] allows, it is by far best to end a sentence with a verb; for the power of speech is in verbs.'

While the issue of style in Sanskrit has been considered in previous studies (e.g. Jacobi 1903, Renou 1956), a detailed study of how the rhetorical structure of Sanskrit texts compares to the rhetorical structure of texts written in other languages has not yet been made. The only cross-linguistic comparisons of rhetorical structure of which we are aware are Wells 1960 and Nakamura 1964. However, their discussions are more oriented toward the formulation of very broad generalizations based on cursory surveys of texts rather than detailed studies of selected texts.

To make a beginning in examining the similarities and differences between the organization of discourse in classical Indian and western writing, we propose to investigate rhetorical structure in the Sanskrit and Greek fable literature. Specifically, we will examine fables from the Pañcatantra and Aesop's Fables which describe similar characters and events (thus minimizing the role of content as a determining factor for rhetorical structure).

In examining these fables we will consider the following areas: (1) nominal vs. verbal style, i.e. whether the Sanskrit style is more nominal than the Greek style (regarding Sanskrit style, see Jacobi 1903, Wells 1960); (2) circular vs. linear organization, i.e. whether the discourse organization of the Indian fable is more circular than that of the Greek fable (regarding circularity in the modern Indian tradition, see Pandharipande 1982, Y. Kachru 1983; on western styles, see Kaplan 1966,

B. Kachru 1986); (3) cumulative vs. descending manner of presentation, i.e. whether important information in the fables is presented at the beginning (as in Aesop) or gradually (as in the Pañcatantra). These three areas will be discussed in later sections following a brief introduction to the texts. We will conclude with a discussion of our findings and a suggestion concerning methodology for further research.

2.0 The Texts

The Pañcatantra and Aesop's Fables are both major fable collections in their respective traditions. The fables in the Pañcatantra are linked to each other in such a way that one story introduces the next within an encompassing frame-story. Aesop's fables are unconnected and organized alphabetically. While many versions of each collection exist, we selected for our inquiry Pūrṇabhadra's version of the Pañcatantra and the Augustana recension of Aesop's Fables. These versions were selected for the following reasons: (1) They are both primary versions of the texts; (2) they are both prose works; and (3) they contain the largest number of fables with similar themes.

As far as the question of influence between the two fable traditions is concerned, we make the following observation. While previous research has traced the migration of fables from India to the western world through a series of translations (Hertel 1914), this migration occurred after the formation of the Greek tradition. Therefore we consider similarities between the Pañcatantra and Aesop's Fables to be limited to the level of peregrinary motifs and loci communes.

Below we list the five corresponding fables which we selected for comparison:

(3)	<u>Pañcatantra</u>	<u>Aesop's Fables</u>
1 a)	Crows and Serpent (P 1.5) ²	Eagle and Fox (A 1)
b)	Heron, Fishes, and Crab (P1.6)	
2)	Two Geese and Tortoise (P 1.16)	Turtle and Eagle (A 259)
3)	Gold-giving Serpent (P 3.6)	Farmer and Snake (A 51)
4)	Ass in Tiger-skin (P 4.7)	Ass in Lion's Skin (A 199)
5)	Adulteress Tricked by Paramour (P 4.8)	Dog Carrying Meat (A 136)

3.0 The Investigation

We understand rhetorical structure to mean the 'method of presentation' or the way in which a story is told, i.e. how the discourse organization and the lexical elements used by a writer emphasize different facets of the story and guide the reader toward a particular conclusion (in the case of fables, the moral). Thus rhetorical structure is stylistic in so far as the telling of stories in a particular way is a matter of choice. For example, by looking at corresponding lines in two versions of the same Pañcatantra fable, we can see a high degree of stylistic variation with respect to the inclusion of detail, though both fables belong to the same tradition:

- (4) atha sa tām bakagrīvām samādāya śanaiḥ śanaistajjalāśayamāsasāda (Kale 1.7)
then he it heron-neck <go> gradually that pond<set back>
'Then he having taken the heron-neck slowly set back to that pond.'
- (5) kulTrako 'pi grhītvā bakagrīvām utpalaṅślavadākāśagamana-
crab so <seize> heron-neck lotus-stemlike air-going
prasādhitacihnamārgo matsyāntikameva prāyāt (Tantrākhyaḥ 1.5)
subdued-sign-conveyor fish near so <set off>
'So the crab, being the sign-conveyor of the subdued bird, having seized the lotus-stalk
heron-neck, set off for the presence of the fish.'

Similar stylistic variation can be found in different versions of Aesop's fables, as can be seen in the following corresponding lines:

- (6) Ge ḍrgou paida ophis herpusas apekteinen. (A 51)
of farmer son snake <creep> <kill>
'The snake, having crept up, killed the farmer's son.'
- (7) Ophis ge ḍrgou paida dēxas en tōi podi parakrēma nekron edeixen. (A 51)³
snake of farmer son <bite> in the foot immediately corpse <render>
'A snake, biting the farmer's son in the foot, immediately rendered [him] a corpse.'

As we can see from these examples, both languages have the lexical resources available to them for conveying the essential meaning, as in (4) and (6), and for embellishing this meaning, as in (5) and (7). Moreover, both languages use case inflection in the nominal system to show the relationships between subjects and objects to each other and to the action described. A rich verbal morphology is found in both languages, as we can see for example in the frequent use of the absolutive (e.g. *grhivā* 'having seized' and *herpusas* 'having crept' in the examples above). What is of interest to us in this investigation is how the two languages use similar linguistic resources to relate similar stories in what we will argue to be dissimilar ways, that is, each language exhibits a different rhetorical structure. In the following sections we will discuss in detail the three topics in rhetorical structure enumerated above.

3.1 Nominal vs. Verbal Style

Sanskrit texts have been characterized as being written in the nominal style in contrast to the verbal style found in writings in western languages such as Greek (Jacobi 1903, Wells 1966). Nominal style can be defined as a writing style in which nominal forms are preferred to verbal forms. Characteristics of nominal style include the following traits.

First, finite verbs are not found as frequently in texts written in the nominal style. In place of such verbs one finds 'nominalizations', for example verbal nouns or adjectives, and absolutives used to present accompanying actions. As a result of these nominalizations, the number of clauses in a nominal-style text is reduced. Another characteristic of the nominal style is the greater frequency with which verbs (especially the copula) are omitted. The nominal style is contrasted with the verbal style in the examples below:

- (8) John made a beginning on his thesis. (verbal noun)
(9) John began his thesis.
(10) It is the done thing. (verbal adjective)
(11) They do such things.
(12) The liar endangers his reputation.
(13) He who lies endangers his reputation. (two clauses)
(14) Having applied for the job John ate lunch. (absolutive)
(15) John applied for the job and then ate lunch.
(16) sarpaḥ kr̥ṣṇaḥ (copula deletion)
snake black
'The snake [is] black.'

In addition to these general characteristics of nominal style, Sanskrit morphology permits another method of nominalization in its rules for compound formation. In Sanskrit, an uninflected verb can form part of a nominal compound, as in the adjectival compound shown in example (17). Here the participle *nyasta* (*ni- vās*) is uninflected. The use of such compounds decreases the number of inflected verbs in a text.

- (17) (a) ntaḥpuraṃ jalāśannanyastakanakasūtramuktāḥ śra-vastrābharaṇaṃ (P 1.5)
harem water near <set> gold necklace pearl cloth ornament
'the harem having set down near the water gold necklaces, clothes and ornaments.'

for the verbal adjective) we can see that the Sanskrit shows more of a nominal style. But it should be noted that all of these constructions are possible in Greek and that the Greek fables are significantly less detailed than their Sanskrit counterparts (see below).

Of the characteristics of nominal style, the use of non-finite verbs to convey actions in Greek offered a clear parallel to Sanskrit, as we can see in the following example containing four participles and only one finite verb:

- (24) exelthousēs de pote autēs epi nomēn ho aetos aporōn trophēs kataptas eis
 part. part. part. part.
gen. absolute
 <go off> once it for food eagle-<be at loss> food < fly down> into
 ton thamnon kai ta gennēmata anarpēsas meta tōn hautou neottōn
 bush young <snatch up> with own young
 katathoinēsato. (A1)
 aorist
 <feast>
 'It [the fox] once having gone off for food, the eagle, being at a loss for food, flying down into the bush and snatching up the young [of the fox], feasted with its young.'

In this sentence, the only finite verb is *katathoinēsato* which appears only after many actions have been described in the preceding chain of participle constructions. However, such examples of 'chaining' in the Greek fables do not seem to be strictly parallel to the chains of participles found in Sanskrit. First, clauses in the Greek fables usually do not contain more than one participle per clause. At times, these participles do not necessarily lead to a reduction in the number of clauses as we can see in example (25). In this example we have three participles (two in one clause) and four clauses:

- (25) ho de epi toutōi deipnopathēsas pelekun anelabe kai paragenomenos
 he at this <to be grieved> axe <seize> and <to be near>
 eis ton phōleon autou heistēkei paratēroumenos, hopōs,
 to hole of it <to stand> <to watch> in order that
 an exiēi, eutheōs auton pataxēi.
 if <to go out> immediately it <to strike>
 'And he [the farmer] being grieved at this seized an axe and going to the hole of it [the snake] stood watching, in order that, if the snake should come out, he might immediately strike it.'

Furthermore, in the Greek fables brevity rather than style may be the motivating factor for the strings of participles. The Greek fables are considerably more concise than the Sanskrit fables (e.g. in 'Crows and Serpent' the Sanskrit fable is roughly 350 words long while the corresponding Greek fable is less than 200 words long; 'Gold-giving Serpent' has about 200 words in Sanskrit compared with 100 in Greek). Thus these strings of participles in the Greek may have been used to make the sentences more concise and need not be taken as a confirmation of stylistic choice. With this adjustment, and keeping in mind the fact that verbal adjectives formed from participles do occur in the Greek, we conclude that the Sanskrit fables exhibit a nominal style while a verbal style is characteristic of the Greek fables.

3.2 Circular vs. Linear Organization

In the area of textual organization, we found that the Greek fables proceed in a linear fashion: in general each begins with a line introducing the characters and describing a situation. The narration of events follows and the story concludes with a moral. On the other hand, the Sanskrit fables show a circular organization: The moral is introduced at the start (or more precisely at the end of the preceding story, which serves as an introduction to the present one). The story then follows and the moral may

only be referred to at the end (only the first words being reiterated). The reader is thus at times compelled to return to the beginning of the story to recollect the moral.

To illustrate this difference in organization, we may look at the different ways in which Greek and Sanskrit present stories based on the same theme -- the unrewarded abandoning of what one has, in the hopes of gaining something better. In the Greek fable, entitled 'Dog Carrying Meat' (A 136), the first line immediately introduces the dog and describes the background for the story:

- (26) Kuōn kreas ekhousa potamon diebaine.
'A dog with a piece of meat was crossing the river.'

The story continues by telling how the dog drops the piece of meat which it has in pursuit of another larger piece (in reality, a reflection in the water). The fable then concludes with the moral which explicitly states what the reader is to understand from the story:

- (27) Pros andra pleonektēn ho logos eukairos.
'For the greedy man the story is appropriate.'

In contrast, the moral of the corresponding Sanskrit fable (entitled 'Adulteress Tricked by Paramour') first appears at the end of the preceding fable (P 4.7):⁴

- (28) yād ṛśāṃ mama pādṛṣṭiyāṃ tād ṛśāṃ dviguṇaṃ tava
nābhūj jāro na bhartā ca jale tiṣṭhasi nagnike (P 4.8)
'Just as my wisdom so is your cleverness. Nought has come of [your] lover or husband. In the water you stand, o naked one.'

The fable proper begins as follows:

- (29) kasmīṃścid adhiṣṭhāne hālikadampatī prativasataḥ sma
'In a certain place lived a ploughman and his wife.'

In this first line, we are only introduced to the ploughman and his wife whom we later learn is much younger and very unfulfilled. The wife meets a young man and runs off with him, taking her husband's money with her. But he eventually abandons her on the other side of a river, taking the money as well as her clothes. While sitting on the river-bank, the woman sees a jackal carrying a piece of meat. The jackal, seeing a stranded fish, drops the meat to pursue the fish, only to have the fish escape and a vulture steal the meat. The woman chides the jackal for losing both the fish and the meat. The jackal in turn rebukes her for the loss of her husband's money (and perhaps her husband) and her lover, quoting the moral (see (28) above).

The presentation of this fable is circular in two ways. Not only does the moral begin and end the narrative, but also the jackal's story of loss brings the tale back to the woman's story of loss. In contrast, the organization of the Greek fable proceeds in a linear manner. All of the major characters are introduced at the beginning of the story and the narration of events leads directly to the moral.

Furthermore, the Greek fables relate only those events which are essential to the story. In consequence, these fables tend to be short and to have simple plots. By contrast, in 'Adulteress Tricked by Paramour', the stories of the ploughman's wife and the jackal are artfully juxtaposed. In general, the Sanskrit fables show a greater tendency to digress and to spin out the stories in elaborate detail. A prime example of digression is found in 'Heron, Fishes, and Crab', in which the water-creatures fear for their lives because their lake is going dry. In Kale's version (1.7), there are eight lines (including three ślokas) devoted to explaining the astronomical situation causing the drought. A good compact example of the amount of detail found in Sanskrit fables can be seen in the precise description of the sizes of fish which the heron consumes:

- (30) bhak śayitv ā bah Ūn matsy ān uttam ādhamamadhyam ān
 atilauly ād baka ḥ ka ścin mṛta ḥ karka ṭakagrah āt (P 1.5)
 'A heron, having eaten many fish, large (uttama) small (adhama) and medium (madhyama),
 his greed never satisfied, because of the grasping of a crab, died.'

The degree of detail as well as the number of digressions in the Sanskrit fables stand in marked contrast to the straightforward relation of facts in the Greek fables. These two features illustrating deviation from the point are further examples of circularity in the Sanskrit fables.

3.3 Cumulative vs. Descending Presentation

In terms of manner of presentation, we found that the Greek fables show a descending style of presentation in so far as important information (e.g. characters and events essential to the story) is presented at once with supporting information being introduced later. On the other hand, the Sanskrit fables show an ascending or cumulative style of presentation since important information is not immediately, but is rather gradually introduced, as the story unfolds.

The emphasis on the direct introduction of characters and events in the Greek fables can be seen for example in the fable entitled 'Farmer and Snake' (A 51). In the first line, all of the major characters of the fable are introduced and an important event is described:

- (31) Ge ḡgou paida ophis herpusas apekteinen. (A 51)
 of farmer son snake <creep> <kill>
 'The snake having crept up killed the farmer's son.'

The remainder of the fable relates how the farmer in revenge attempts to kill the snake with an axe, but missing the snake splits a rock in half. The farmer then attempts to reconcile himself with the snake. The fable ends with the snake's reply that no reconciliation is possible, and with the statement of the moral:

- (32) ho logos dēloi, hoti hai megalai ekhthrai ou raidias tas metallagas ekhousi. (A 51)
 'The story shows that great hatreds do not have easy reconciliations.'

Thus we can see that the Greek fable proceeds in a descending manner in which the major characters and the situation are introduced at the beginning. The remainder of the fable describes the resolution of this situation and gives the statement of the moral.

In the corresponding Sanskrit fable, the theme of a farmer's son being killed by a snake is also present, though the events narrated do not center around this event. Rather, the story reads like a description of the farmer's experiences during a particular period of his life. The first line of the Sanskrit fable introduces only the farmer (the brahman) and does not give any further background for the story:

- (33) asti kasmimścid adhi ś ḥ āne ko 'pi br āhma ṇa ḥ (P 3.6)
 <be> certain place brahman
 'There was in a certain place a certain brahman.'

The next two lines talk about the unproductiveness of his farmwork, and his falling asleep under a tree. The snake is only very casually introduced in the fourth line:

- (34) anati dūre valmīkopari pras āritab ṛhatpha ṭa ṭopam bh ṭ ṣa ṇam bhujamgamam dṛ ṣ ṭv ā
 cintay ām āsa (P 3.6)
 'Having seen, not far away, above an anthill, a frightening serpent having a great swelling
 hood extended, he reflected.'

In the following lines, the relationship that develops between the farmer and the snake is detailed. Eager to become more successful, the farmer decides to honor the snake (whom he perceives as a

divinity), and daily presents the snake with milk. In return, he finds one gold dinar each day at the hole of the snake. It is only in the fifteenth line that the farmer's son is introduced into the narrative, and again, the introduction is not direct but rather incidental:

- (35) athaikasmin divase valmīke kṣṭrānayanāya putram nirūpya brāhmaṇo grāmam jagāma.
"Then one day, the brahman went to the village, having appointed his son for taking the milk to the ant-hill." (P 3.6)

The son, who also receives a dinar for his milk-bringing, concludes that the home of the snake must be filled with dinars, and he attempts to kill the snake. But the snake lashes back, killing the boy. The boy's cremation, and the farmer's reaction on his return are described, and then the moral is given:

- (36) bhūtān yo nānugrṇānti grṇānti śaraṇāgatān
bhūtānti tasya na śyanti haṁsāḥ padmavane yathā (P 3.6)
'He who does not treat well his creatures and abuses the one coming to him for refuge, his possessions perish just as the geese in the lotus forest.'

As can be seen in the gradual and casual introduction of characters, the Sanskrit story unfolds, showing a cumulative style. The Greek approach is much more direct. The actions follow one after another in direct consequence of each other.

These two approaches, descending and cumulative presentation, are also reflected in the syntactic constructions used in the fables. While both languages have great flexibility in word order, we found that the subject is usually fronted in the first lines of the Greek fables, while the subject appears near the end of the sentence in the first lines of the Sanskrit fables; cf. e.g. the examples in (31) and (33). However, a broader study of the syntactic correlates is necessary. For example, it may be that the non-fronting in Sanskrit follows from the formulaic beginning *asti kasmimścid* (cf. 'once upon a time') of many Sanskrit first lines. But the evidence which we have collected so far points toward descending presentation in Greek and cumulative presentation in Sanskrit.

4.0 Discussion

Thus in the areas considered, the Sanskrit fables tend to be more 'nominal' than their Greek counterparts; they show a circular organization; and their presentation of information is cumulative. In contrast, the Greek fables tend to be more 'verbal', exhibiting a linear organization and a descending manner of presentation. While these conclusions are only preliminary to an investigation of rhetorical structure, they are a beginning and, based upon these findings, we make the following observations.

First, it is interesting, and even ironic, that in telling a story Sanskrit uses the nominal style, while in stating facts Greek uses a verbal style. This finding should be considered in light of Jacobi's observation (Jacobi 1903; see also Hock 1975) that the nominal style is more closely associated with scientific and abstract thought.

Second, it is clear that rhetorical organization is independent of content, since the fables which we compared narrate similar events; nor does the purpose of presentation affect rhetorical organization, since fables are the vehicle for the expression of a moral. We conclude that the different rhetorical structures used in the fables are the result of their being written according to the norms of their respective traditions and cultures. In this view, our findings offer evidence in support of current research claims about the linearity and directness of western thought and the circularity and digressiveness of 'oriental' thought.

Finally, in considering to what degree a written text uses a nominal or verbal style, we would suggest the introduction of some quantifiable means of assessing the noun-like or verb-like qualities of lexical items which are not so much nouns or verbs per se, but nominalizations and verbal derivatives (such as participles and absolutes). While the precise formulation of this quantifiable system requires further consideration, as a beginning we would suggest the introduction of some ranking scheme which could be applied in a stylistic analysis based on whether a lexical item is more

like a noun or verb in the features for which it inflects. We suggest for example the following ranking scheme:

- (37) Noun = 5
 Nominalization = 4
 Participle = 3
 Absolutive = 2
 Finite Verb = 1

Once the lexical elements of a text have been ranked, a low-scoring text can be considered as showing a more verbal style; a high-scoring text can be considered as showing a more nominal style.

NOTES

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²References beginning with P are found in HERTEL 1908; references beginning with A are found in HAUSRATH 1962.

³From the Vindobonensis recension, a version of the fable based on the Augustana recension (version II in HAUSRATH 1962).

⁴There is a slight rewording (of two words) between the first and second appearance of the verses.

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INTERACTIONAL SOCIOLINGUISTICS AND GENDER
DIFFERENTIATION IN NORTH INDIAN SPEECH

Tamara M. Valentine

This paper explores how using an interpretive approach to language can help to account for both the shared grammatical knowledge and the differences in communicative styles in terms of female-male gender differences. The paper examines the continuous verbal interaction between male and female speakers in conversations and explores each speaker's recurrent speech patterns and verbal strategies. The analysis is based on spoken data and literary-based contexts to illustrate: first, a differential use of language strategies and speech patterns by male and female speakers in cross-sex conversation; and second, that a shared knowledge of language, background assumptions, and contextualization conventions are essential in order to initiate negotiation for a successful and effective verbal interaction. When sociolinguistic rules are not shared by speakers, then they must exercise a great deal of verbal work, and often the result is communication breakdown.

Conversational Cooperative Principle

The theoretical principle on which this analysis is based is that of Gumperz's (1982a) conversational cooperation. That is, a conversation is seen as an on-going process of cooperation and negotiation, a continuous interacting and sharing between speaker-listener. It is a process by which participants assess each other's intentions and on which responses are based. However, as one knows, in order for two participants to negotiate, it is essential that they first lay some groundwork.

In conversation, in order for negotiative management to begin, a certain amount of shared expectations and actions need to be signalled. These signals are known as contextualization conventions and are defined as "constellations of surface features of message form [which] are the means by which speakers signal and listeners interpret what the activity is, how semantic content is to be understood and how each sentence relates to what precedes or follows." These cues are acquired as a result of a speaker's communicative experience which is based on her/his social interpersonal networking position (role, status, etc.) The individual acquires different cues depending on her/his cultural background, gender, social

status, and other factors in a lifetime. Once acquired, contextualization conventions operate automatically and are habitually used and perceived. Therefore, contextualization conventions must be examined beyond the traditional linguistic analysis and studied in process and in context rather than in the abstract.

Inclusive under these verbal cues are prosodic features, style switching, and verbal strategies (i.e. formulaic expressions, lexical and syntactic options, conversational openings and closings, topic initiation, flow, and shift, etc.) which carry conversational information and indicate discursal expectations. When these interpretive processes are understood, taken for granted, and go unnoticed between partners, then conversation goes on successfully as planned.

Even though all speakers have the ability to produce grammatical sentences, linguistic competence is not enough for an effective conversation; communicative competence must be taken into consideration. For example, one speaker's knowledge of the contextualization conventions and her/his networking relations may differ from those of another speaker. Often, due to one participant being unaware of the functions and the meaningfulness of the relevant cues which are exhibited by another speaker, misjudgments, misunderstandings, and the failure to communicate occur. Such miscommunication has been illustrated in a number of studies on conversation between participants of different linguistic and cultural backgrounds (Heath 1983, Gumperz 1982a, Mishra 1982, Tannen 1982, Young 1982). This observation can be extended to the concepts of cline of proficiency and the notions of intelligibility, interpretability, and comprehensibility in the non-native varieties of English around the world (see Kachru 1981, Smith ed. 1981, Smith and Nelson 1985).

This study operates within a framework which assumes that variability in linguistic structure is a systematic feature of language. Gender is seen as one of several social parameters.² It, like other social variables, is participant information which can be obtained and conveyed through communication (Cook-Gumperz 1984, Dittmar and von Stutterheim 1984, Dodderidge and Simonet 1984, French 1984, Gumperz 1982a, Gumperz and Cook-Gumperz 1982, Hansell and Seabrook Ajirodotu 1982, Keim 1984, Maltz and Borke 1982). Gender refers to the speech marker which identifies the speaker/user as a member of a particular cultural group, marks the message identifiable with the particular group, and determines an individual's role in a verbal interaction. Gender is communicated through language as it is perceived in particular contexts. Hence within this approach gender is seen as a symbol which is communicatively produced and has meaning in conversation. The question arises, then, to what extent are the social knowledge and linguistic signs and functions shared by female-male speakers and how are they signalled by conversationalists.

Observations and Data

This paper examines typical natural instances of speech events which on the surface have all the features of the norms of turn-taking, rules of question-answering, conventions of topic initiation and success, topic flow and shift, etc.

The first piece of data I examine is a tape recording of a spoken informal conversation between an Indian wife and husband in their home; both are native speakers of Hindi.³ The latter set of cross-sex conversations I examine is from contemporary literary texts of Hindi (Upendranath Ashk 1976, Usha Priyamvada 1967, Nirmal Verma 1964) and of Indian English (Mulk Raj Anand 1947, 1960, Roman Basu 1974, Anita Desai 1980, Dina Mehta 1981). Each passage examined is a logically sequenced, self-contained, and continuous episode which documents and demonstrates how each participant interprets and responds to her/his partner's utterances in a particular context. Such dialogues offer a look at the discourse conventions at work, how the partner's identity is recognized, what the relative status and power of the participants indicate, what the speakers' aims are, and whether interpretive processes are understood. The use of various verbal strategies⁴ of speakers reveal each individual's choice of speech style.

Analysis

Given the above observations about language use in verbal interactions, let us now consider a few examples of two-speaker conversations, i.e. female and male Indian Hindi speakers, and ask the following questions: 1. What are the participants doing? and 2. How are they accomplishing it?

Oral Hindi exchanges

In the first actual verbal exchange below (I), two native speakers of Hindi, speaker M, the husband, and speaker F, the wife, are conversing with each other. A native speaker of Hindi might not necessarily find the conversation out of the ordinary nor have any difficulties in getting a general idea of what is happening. I want to suggest, however, with the help of the interpretive approach, that despite the conversation's simplicity and ordinariness on the surface, there are a number of peculiarities of which only speakers M and F are aware. And only because they share certain background knowledge and communicative skills do they achieve effective communication with each other.

I.

1. M: bartan bhii to dhone the.
The utensils also had to be washed.
2. F: bartan dho diye the maĩ ne raat ke shyaam ko.
(I) had washed the night utensils in the evening.
3. M: ...abhi ke saare bartan bhii to haĩ ...
...There are all the just used utensils also...
4. F: are abhi ke rahane do, phir dhul jaayegẽ.
(pause)

are nal nahii^{~~~~} kholo aawaaz aa rahii hai uskii.
 Okay, let the just now ones remain, they will get
 washed later. (pause) Hey, don't open the tap,
 its making noise.

In episode (I) above, Hindi speaker M the husband is preparing tea in the kitchen. He notices that there are dirty utensils/vessels in the sink. He informs his wife, Hindi speaker F, that bartan bhii to dhone the 'the utensils (also) had to be washed' (1). F's response to M is bartan dho diye the 'I had washed the utensils from the (previous) night (just) this evening' (2). Rather than explicitly referring to those utensils, it appears that speaker F does not acknowledge what speaker M has said at all, but leaves much unsaid. Yet, if we look closely there is a relation between utterances (1) and (2) when we assume that speaker M's intention is to inform his wife that the utensils have not been taken care of yet, and they really should be washed.

From another perspective it may be that the female speaker F is not aware of the dirty vessels in the sink. If we look at the internal evidence it is more likely that she does know about the dirty utensils to which M is referring. In utterance (2) F is informing M of some vessels she had already washed. But underlying this utterance is an indirect signalling that she does not feel like washing more utensils at this moment. Speaker M somewhat alters the conversation as is evident by his uttering abhi ke saare bartan bhii to hai 'There are all the just used utensils also' (in (3)). He does not treat F's remark (in 2) as irrelevant but clarifies and rephrases his first utterance (1) making it known to F that there are freshly used vessels which need to be washed. And in fact, the above assumptions are correct because female speaker F finally directly acknowledges male speaker M's intention and replies are abhi ke rahane do, phir dhul jaayenge 'Okay, let them stay, they'll get washed later' (4).

There are a number of points which need to be discussed about verbal exchanges in general, and this actual Hindi exchange in particular. First, a single utterance can often be understood in a number of different ways. So, one may ask, how does the listener recognize the speaker's intentionality and understand the appropriate, expected meaningfulness of each utterance? Although a dialogue is made up of single utterances each carrying information, a listener rarely treats each individual word or sentence separately. For if a language user were to approach conversation in this manner the utterances would seem disjointed and not coherent. Therefore, the intended meaning to be conveyed can only be relevant and understandable if the interaction is taken as a single whole and each sentence relates to what precedes or follows.

Second, such an exchange as (I) will have more meaning or significance to those participants who share the expectations about how the intentions are to be communicated. The

interlocutors base their responses on what linguistic and sociocultural knowledge they share and on what is happening at the time of the interaction. With this information they can negotiate minimally and accomplish the goal of effective communication (i.e. M's informing F of the dirty utensils).

Speakers M and F are relying on some shared understanding, i.e. role, status, rights/duties in the home, daily routines, expectations of home activities, etc. That the utensils are usually washed by female speaker F in this family household makes it easy for her to recognize that her husband's utterances (in 1 and 3) are indirect requests for her to clean the recently dirtied utensils. Speaker F's reply (in 4) implies that they will be done later (by her), but to leave them in the kitchen sink for now. This utterance confirms the interpretation. To reach this goal the interlocutors are relying on indirect inferences, which have been built upon past communicative experiences of their family habits.

Third, from this actual on-going conversation we are able to recognize that the two participants are verbally cooperating and negotiating with each other. That the two participants have seen beyond the surface forms, and that the indirect messages are understood, are evidenced in the successful outcome, i.e. female speaker F appropriately replies are abhi ke rahane do, phir dhul jaayēge 'Okay, let those utensils remain, they will get washed later' (4).

Fourth, in addition to noting the interpersonal behavior between speakers and the simple surface features of mutuality of conversation, other linguistic skills contribute to the successful outcome. As has been pointed out by a number of scholars in language and gender research (Bennett 1982, Eakins and Eakins 1976, Edelsky 1981, Fishman 1978, 1980, 1983, Leet-Pellegrini 1980, Sattel 1983, West 1979, West and Zimmerman 1983, Zimmerman and West 1975, to name a few), the discursive work done by male and female speakers in American English cross-sex conversations is accomplished differently. Verbal strategies which are available to all speakers are motivated, understood, and sometimes interpreted differently.

Similarly, in previous non-Western studies (Valentine 1985, 1986), it is revealed that when female and male Hindi or Indian English speakers verbally interact they adopt a differential use of discursive strategies and skills. Speech patterns such as initiation and maintenance of discourse topic with question and statement forms, topic flow and shift, and organizational linguistic devices, i.e. acknowledgments, formulaic expressions, and speaker selection patterns are variably used by male and female Hindi speakers.

Returning to example (I) above, it is observed that the use of indirect statements to function as requests or inquiries is a verbal skill held by the male Hindi speaker (see utterances 1 and 3). Even though the husband's (M's)

statements do not require a reply from his wife (F), she offers one. It appears that speaker F has interpreted speaker M's intention correctly for M's inquiry is answered by F (4) when she tells him to leave the utensils and she'll attend to them later. As we have seen above, speaker M is not only informing speaker F that there are dirty utensils in the sink, but also implying that since she holds the role of dishwasher in the house they be washed by her.

Similarly, the use of forms of acknowledgments which show explicit agreement or negation of the previous speaker's utterance is a common strategy adopted by Indian female speakers. In example (I) female Hindi speaker F's use of the Hindi acknowledgment are (4) is simply showing explicit agreement with male speaker M's utterance, letting him know that she has heard and understood the intention of his indirect requests. This type of acknowledgment is one way of signalling a shared knowledge of the situation on the part of F, the female speaker. This must indeed be the case because after acknowledging M's remarks with are (line 4) and telling him the dishes will be washed later, she initiates her next utterance with an exclamation, are, and switches the topic.

In addition to these features, the female speaker's use of organizational devices such as boundary markers, fillers, and accompaniments, are observed in other actual Hindi exchanges as well. In II below between a husband and a wife (speakers M and F, respectively) the differential use of such devices is illustrated. In this particular household, the normal routine is that the father usually attends the children's school for parent night. After he has returned from the school, the wife, speaker F, asks her husband, speaker M, what was happening there, were there refreshments, who was there, etc. The male speaker M responds to each question appropriately. As he relates the events at the school, female speaker F develops the flow of the conversation by encouraging her husband's talk with an excessive amount of regulating markers such as hm, hãã hãã 'yes, yes', accha 'good', and question forms at particular designated places in her husband's speech. The interpretation that the female speaker F is setting the rhythm in this conversation is correct because the male speaker answers his wife's questions appropriately on time and continues to narrate the happenings at the school.

II.

F: inke klaas mẽ gaye the baacõ ke?
(`Did you go to their class, the children's?')

M: hãã, mã pahale Amraag ke klaas mẽ gayaa
(`Yes, I first went to Amrag's school.')

F: hm
M: to wahãã

Mrs. Kachorski thii. apne par kõi matlab khaas baat nahii huui unse.

(`Mrs. Kachorski was there. But nothing in particular was talked about.')

- F: hm
M: Amraag Singh dikhaa rahe the
apnaa kLaasruum
('Amraag Singh was showing his classroom.')
- F: hm
M: ki kahãã kahãã baiThte hai
('where everyone sits')
- F: hm
M: pããc cenTer hai unke to hafte ke pããc din matlab they
go to different centers.
('They have five centers, five days a week, this
means')
- F: hãã hãã
M: kahii pe Maths karte
hai kahii pe ek compuuTar paRaa huaa hai kahii pe
kitaabe paRii huii hãã
('Somewhere they do Math, a computer is somewhere, and
books are lying.')
- F: hm
M: aur kyaa thaa...?
('And what...')
- F: ...aur anne ke yahãã kyaa hai?
...and did you go to Anne's?
M: Anne ke yahãã to der ho gayii thii ab to jaate kyõkii
pahale Amraag ke yahãã gayaa thaa
('It was late to go to Anne's because first I had gone
to Amraag's.')
- F: hm
M: tiiis minaaT to
wahãã lag gaye.
('Thirty minutes were taken up there.')
- F: acchaa
('okay.')
- M: phir waapas jaa rahe the...
('When I was going back...')

It appears from this exchange that female and male speakers do indeed hold different strategies and accomplish conversational work differently. In order to participate in such an exchange it must be assumed that each participant comes into a conversation with their own sociocultural knowledge and set of discursal strategies. In the above examples, although each speaker contributes to the conversation distinctly it is only because they understand each other's conventions that the conversation is successful and a flowing rhythm is set. Although these gender-specific skills may be motivated differently and have varied intentions, their shared cultural and linguistic knowledge help them to interpret each other's use of these strategies properly according to the context. In such cases the communicative outcome is successful.

When an Indian male and female speaker interact, then, either the two participants have the same set of verbal skills to interact, i.e. hold the same sets of discursal strategies

such as those listed above, or different sociolinguistic strategies are used depending on shared knowledge, participant information, and social context. The former is highly unlikely as I have shown above. What is more probable, however, is that each speaker is somewhat, even if unconsciously, aware of the meaningfulness, purpose, function, and intention of the use of the other's skills/strategies for verbal communication. That is there is a sharing of linguistic and sociocultural assumptions. Since males and females are constantly communicating with each other daily, there must be some amount of sharing of the knowledge of each other's sociolinguistic rules. In other words, although cross-sex communicative patterns are governed and directed by the distinct sociolinguistic discourses, for a fuller conversation it is essential that each participant make an effort to be aware of the other participant's skills and to adapt their own strategies to achieve communicative flexibility (Gumperz 1982a). When speakers adopt this attitude in conversation, miscommunication is less likely.

Conversational Exchanges from Literary Texts.

Episodes extracted from written Hindi and Indian English fiction writing similarly show some cases where the male and female interlocutors share expectations about how the intentions are to be communicated and where communicative goals are met.

In the following Hindi and English examples (III and IV, respectively), the goals implied by the males are met by the females. In example (III) from the Hindi short story "Kitnaa baRaa jhuuTh" by Usha Priyamvada (1967), the husband, Vishwa makes it known to his wife Kiran that he has no clean shirts to wear (lines 1-3: laandrii se kamiizē laanaa bhul gayaa. Ab koi saaf kamiiz nahii hai. 'I forgot to pick up my shirts at the laundry. Now I don't have any clean shirts'). Although the husband does not make an overt request, Kiran interprets her husband's statement as an indirect request for a clean shirt. To gain a more thorough understanding of what underlies this interaction and how and why Kiran interpreted Vishwa's statements as she did, both the verbal and nonverbal cues together must be examined. The extralinguistic cues the author provides, such as Vishwa's rummaging through his shelves (line 1), and contextualization conventions, such as Vishwa's open ended statement Ab koi saaf kamiiz nahii hai 'Now I'm all out of clean shirts-' (line 2) and his desperate, informative statement saavar lenaa caahtaa tha 'I wanted to take a shower' (line 3) help to trigger Kiran's decision and action. In line 4 she utters with honorific aap 'you', aap jaakar nahaaiye. mai kamiiz naikaale detii huu 'Go shower, I'll get the shirt'.

III.

- 1 Vishwa ne draar khakhorate hue kaha, "laandrii se kamiizē laanaa bhul gayaa. ab koi saaf kamiiz nahii hai. saavar lenaa caahtaa tha."

Vishwa, rummaging through his drawer, says, "I forgot to pick up my shirt at the laundry. Now I have no clean shirts. I wanted to take a shower."

- 5 "aap jaakar nahaaie. mǎĩ kamiiz nikaale detii hũũ." kiran ne uThte hue kahaa. uThkar apniĩ almaarii kholiĩ aur ek ghuliĩ kamiiz nikaalkar vishwa ko pakraa dii. wakt-bewakt ke liye hameshaa kuch kapRe apniĩ almaarii me rakhtii hai.

"Go take a shower. I'll get you a shirt", Kiran said getting up. Getting up she opened the closet and taking out a clean shirt handed it to Vishwa. For such times she always kept some clothes in the closet.

In example (IV) from the English fiction writing of Mulk Raj Anand (1947:12), *The untouchable*, the context is more well-defined. The brother, Bakkha, enters the house after a hard day's work, his sister, Sohini, is trying to light a fire. When Bakkha disappointedly finds there is no water in the earthen pan (line 1) nor in the pitcher (line 3) he exclaims oh! (line 7). His sister interprets her brother's statement in line 3 and his exclamation in line 7 as meaning 'I am too tired to get the water, would you get it'? That the female speaker has seen beyond the surface meaning of oh is probably due to the shared understanding between brother and sister, i.e. interpersonal networks. She is able to perceive and interpret the contextualization cues which are influenced by the family communicative habits, i.e. the family chores, retrieving of water, etc. The brother's verbal and nonverbal cues up to his exclamation oh! (line 7) lead the female speaker, Sohini, to the actual meaning of the male speaker's talk and then to her decision to meekly offer to get the water (in line 10). That this interpretation is correct is verified by Bakkha's informal uttering of the affirmative Hindi acknowledgment acchaa 'okay' (line 11).

IV.

- 1 He put the earthen pan over the little stove.
 `There is no water in that,' his sister said.
 `I will get some water from the pitcher,' he said,
 as he casually made towards the corner.
- 5 `There is no water in the pitcher either,' she answered.
 `Oh!' he exclaimed under his breath, tired and exasperated. And for a moment he stood defeated where he had bent down to the pitcher.
- 10 `I shall go and get some water,' said Sohini meekly.
 `Acha,' agreed Bakkha without any show of formality.

As the above examples intimate, even before the interaction takes place the participants infer what the interaction is about and what is expected of them. All extralinguistic cues (such as interpersonal networking patterns, family expectations, gender roles, etc.) and contextualization

conventions (such as indirect requests, question-statement forms, minimal responses, etc.) are considered before making a response. But once involved in the verbal exchange, the responses or negotiating procedure relate to what the speaker intends, (e.g. getting a clean shirt or washing the dishes) and how the listener interprets the utterances and responds (by getting the shirt or washing the dishes.)

Nevertheless, there is a tendency to take for granted that conversational maintenance exists, that all verbal participants cooperate and negotiate, and all interpretive conventions are shared. Up to this point I have provided examples of situations where the interlocutors share expectations and discursal strategies, and therefore they achieve communicative flexibility. But to understand successful communication, we need to focus on interactions in which communication is not successful. There are times, as in the Indian English examples (V) and (VI) below, where due to a lack of sharing and negotiating between participants, the utterances are interpreted literally. Because there is a lack of conversational cooperation the situations become extremely awkward, and misunderstanding and miscommunication occur.

In example (V) from the Indian English writer Romen Basu's short story A gift of love (1974) an impatient female speaker purposely understands the literal meaning of the question "Do you have courses in marine engineering?" addressed to her by a male speaker. And in example (VI) from Bhabendranath Saikia's short story The cavern, (1981) a female speaker understands the routine expression "I'll meet you some other time" to mean 'we will meet another time, let's set a date'.

V.

"Now, what is it you wish to register for?" she asked impatiently.

"Do you have courses in marine engineering?"

"I don't have anything. I only work here."

...I had more questions to ask but, feeling discouraged, kept silent.

VI.

"It's very late now. I'll meet you some other time."
The words tumbled out of Mr. Prener's lips.

"Will you, really?" Mary's eyes brightened. "Thank you very much sir. Thank you very much."

In these examples, although the participants may agree on the overall purpose of the interaction, there are differences in the expectations and rights, as well as in the interpretation of the discursal strategies involved. When the interlocutors notice the relevant cues, understand the speaker's choice of strategy, and are aware of their intentions the interpretive processes are taken for granted and the conversation is created, developed, and sustained. Such an awareness helps to establish personal contact and to negotiate

the proper interpretations. However, in passages (V) and (VI) above one participant is not willing to adapt or to achieve communicative flexibility. One speaker reacts differently to the cue than expected and the outcome is misinterpretation and misunderstanding.

If we turn our attention to the Hindi exchange (VII) below, an excerpt from Upendranath Ashk's (1976) tauliye, we may get the impression that the conversation between the male and female speakers is successful, otherwise it would have collapsed long ago. But after a closer look, we see that the conversation is not developing as smoothly as it could.

In this episode the female participant Madhu (M) and the male participant Vasant (V) are discussing the subject of appropriate social behavior. However, if we look at the dialogue closely we find that the male Hindi speaker (V) does not consistently and appropriately interpret the female Hindi speaker's (M) verbal strategies. Although the conversation progresses, there is a non-sharing of sociolinguistic knowledge between the interlocutors, and the interpretations become misdirected, discursal strategies come into conflict, frustration erupts, and miscommunication seems inevitable.

VII.

1. V: ...- māī jab hāstaa hūū, jii khōl kar hāstaa hūū aur isīliye uushii aur nimmo...
When I laugh, I laugh openly and that's why Ushi and Nimmo...
2. M: aapne phir uushii aur nimmo kii baat cheRii.
mujhe hāsnaa buraa nahīī lagtaa. par samay-kusamay kaa bhii dhyaan honaa caahiye. us din paarTii me aate hii uushii ne mere kaan par cuTakii le līī aur nimmo ne merii āākhē band kar līī. kōīī samay thaa us tarah ke hāsīī-mazaak kaa. mujhe hāsīī-mazaak se nafrat nahīī, badtamiizii se nafrat hai.
Again you bring up Ushi and Nimmo. I don't hate laughing. But keep in mind the time and the place. At a party one day, Ushi covered my ears and Nimmo covered my eyes. It wasn't the time for such a joke. I don't hate laughing, but I do hate bad manners.
3. V: uushii...
Ushi...
4. M: parle sir kii badtamiiz hai. madan ki warS-gāāTh ke din wō sab aaye the. nimmo itnīī cancal hai par wō to baiTh gayii ek taraf ye nawaabzaadii aa baiThii mere samne saiNDal samet, tāāge pasaare aur wō uske gande saiNDal - merii saari ke bilkul nazdiik aa gaye! aap is badtamiizii kō shauk se pasand kare, mai ise hargiz bardaasht nahīī kar saktii. jise baiThne, uThne, bolne kaa saliikaa nahīī, wō aadmīī nahīī - pashu hai
On the other hand, she has bad manners. They all

came to my birthday party. Nimmo is usually restless but she sat on one side, but the princess sat right in front of me with her sandals, sprawling and those dirty sandals - they came so close to my sari. You may like this bad behavior, but I can't approve of it. One who doesn't know how to sit, stand, and talk is not human - he/she is an animal.

5. V: pashu! to tum mujhe pashu samajhtii ho?
 tum aadmii kii sahaj bhaawanaaõ ko nirmam
 warjnaaõ kii beRiyõ me se baadh kar raknaa
 caahatii ho...
Animal! Then you consider me an animal? You want
 to keep a person's natural behavior tied up in
 chains of rules...⁵

To support the argument that communication is breaking down in this female-male speaker exchange the following details are given. First, in turn (1), after talking about 'laughter', a new discourse topic is abruptly introduced by the male speaker, Vasant (V), that of their cousins Uushii aur Nimmo 'Ushi and Nimmo'. The female speaker, Madhu (M), acknowledges and affirms this shift and repeats in her turn (2) aapne phir uushii aur nimmo kii baat cheRii 'again you bring up Ushi and Nimmo'. She then resumes her talk on another subject. She begins to narrate an event which she overtly prefaces with us din paarTii me 'at a party one day'. Vasant, however, does not notice or maybe does not understand her linguistic marker of extended talk for he abruptly intervenes with a new subject in (3), uushii. Although it may appear that the female speaker Madhu has completed her turn, she has not given up the floor but tries again to continue her talk; this time proceeding with the male speaker's topic of uushii. Moreover, it is obvious that Vasant does not interpret the progressive development of Madhu's topic 'manners and appropriate behavior' (2 and 4) because he ignores the progression and only focusses on a part of her turn. It is apparent that he has misinterpreted Madhu's strategy because he only focusses on Madhu's final statement (in 4), jise baiThne, uThne, bolne kaa saalikaa nahii, wo aadmii nahii - pashu hai 'one who doesn't know how to act is not human - but an animal'. He interprets Madhu's development of topic as a personal attack, hence shifting the topic in (5) to pashu! to tum mujhe pashu samajhtii ho? 'Animal! So you think I am an animal?' As a result, the communication appears irreparable and communication seems to be hindered.

Conclusion.

In summary, by analyzing the meaningfulness behind each set of participants' continuous verbal interactions and their discursal patterns and strategies, the correspondences between features of gender and surface rules can be identified. If we assume that the sociolinguistic conventions and rules of male and female speakers differ (as I illustrated above) then it is only natural to think that the background

sociocultural assumptions and contextualization conventions may differ according to speaker as well. When the rules are not shared or no effort is made toward communicative flexibility the conversation may break down and conversational cooperation may not be achieved.

Understanding the strategies and patterns in cross-sex conversations can offer insight and help clarify some of the many problems of discourse in societies today. Such research can show how the social diversity and variation, not only in terms of varied gender, but ethnicity, age, social class, etc. affect conversational management and can provide insight into the processes of discourse in heterogeneous speech communities, i.e. communities of varied gender, age, and social status as well as of different languages.

NOTES

¹Firth (1957) and Malinowski (1932) similarly shared the view of including the entire cultural and social setting in which participants interacted and looked beyond the individual speaker. Their use of context of situation included a description of the regularities of social life, typical roles and situations. That is, once a speaker enters a conversation, the interaction is in a sense already determined. Speakers come into a conversation with a certain set of social roles, habits, styles, etc. and are not actually free to do or say whatever they want. The interpretive approach enlarges the scope of rules governing language use to include communicative acts, events and appropriateness. From this perspective the speaker's extensive knowledge of language use underlies effective communication.

²The main reason the term gender is used in this paper as opposed to the term sex is that the former has meaning in terms of culture whereas the latter is basically a biological attribute.

³The Indian couple were visiting scholars from Tehri Garhwal, Uttar Pradesh. The wife was a Post-Doctorate in the Department of Botany and the husband was a Post-Doctorate in the Department of Chemistry. They were in their late-30's, had two grammar school-aged children (a boy and a girl), and lived for two years in graduate student housing at the University of Illinois, Urbana-Champaign. Their native language was Hindi, which they spoke in the home, and among family members and friends. In all other verbal interactions, they spoke English.

The couple was asked to tape record their conversations during various times of the day in their home. The chunks of data in question were those taped after the family dinner when the husband and wife usually sat down together and had tea.

⁴The interpretation of meaning was checked with other speakers of similar social and linguistic backgrounds.

⁵The English text of Upendranath Ashk's tauliye is from Towels, translated by Edward S. Haynes and Ramesh Shonek. Indian Literature (1981) 24:3.65-85.

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THE GOVERNMENT AND BINDING ANALYSIS OF NEPALI EQUI AND SUBJECT-RAISING CLAUSES*

William D. Wallace

The principles of the Government and Binding (GB) framework treat distinctly clauses which are traditionally labeled EQUI and subject-raising clauses. In this paper, I shall examine the GB analysis of such clauses and discuss the analysis with data from Nepali. First, I shall describe Nepali EQUI and subject-raising constructions. In so doing, we shall observe three distinctions between these constructions which are idiosyncratic to the grammar of Nepali. I shall then apply the GB principles to Nepali EQUI and subject-raising clauses.

The principal focus of the paper will be to determine whether the GB analysis correctly predicts the distinctions Nepali makes between EQUI and subject-raising constructions. We shall see that the GB analysis does generally make the correct predictions and provides further insights into the grammar of Nepali. However, the basic analysis of these constructions fails to predict accurately one feature of Nepali EQUI constructions, indicating that further research is needed on the theory and on Nepali EQUI and subject-raising constructions.

I. Nepali EQUI and subject-raising constructions

Among the complement structures of Nepali are two which require the oblique infinitive in *-na*.¹ The complement structure illustrated in (1) and (2) represents the Nepali EQUI construction.² The class of EQUI verbs includes *thānu* 'to start', *saknu* 'to be able', *cāhanu* 'to want', and *khojnu* 'to try'. All the verbs in this class appear in similar syntactic structures, and I shall use only one or two for purposes of illustration.³

- (1) (a) *ma bhōli-dekhi aDDā-mā jāna thāchu* (C 149)
I-nom. tomorrow-from office-in go-inf. start-prs-1S
'I shall start going to the office tomorrow'
(b) *rām-le gāu-mā māi sāma thāyo* (C 149)
Ram-erg village-in thing-obj. move-inf. start-pst-3MS
'Ram has started to move his things to the village'
- (2) (a) *yo kholā ko tama sakcha ra* (C 140)
this river-obj who-nom cross-inf can-prs-3MS Q
'Who can possibly cross this river?'
(b) *mai-le tyo cThi paDhna sakinā* (C 140)
I-erg that letter-obj read-inf can-pst-neg-1S
'I could not read that letter'

The other complement structure is formed with the oblique infinitive plus *lāḡnu*. This structure, illustrated in (3), I shall refer to as the Nepali subject-raising construction.⁴ *lāḡnu* is the only verb of this subject-raising class.

- (3) (a) *buwā katā jāna lāḡnubhayo*
 father-nom where go-inf begin-hon-pst
 'Where was father going?'
 (b) *rām aba bhāt khāna lāḡyo*
 Ram-nom now rice eat-inf begin-pst-3MS
 'Ram was beginning to eat his meal'

Syntactically, the EQUI and subject-raising structures appear very similar. Both require an infinitive complement with subject-verb agreement indicated on the matrix verb; cf. (1-3). Both structures permit intransitive (1a, 2a, 3a) and transitive (1b, 2b, 3b) complement clauses. Both allow complements formed from passive clauses (4-5) and dative-subject clauses (6-7).⁵

- (4) (a) *us-ki svāsni Dākina saktina*
 him-gen wife-nom call-ps-inf can-prs-neg-3FS
 'His wife cannot be summoned'
 (b) *patrapatrikāharu-mā ākalajhakala nepāli ādhunik kathā-kā*
 magazine-pl-in by-fits-and-starts Nepali modern story-gen
maulika svarupharu dekhina thālekā hun (SK 11)
 original form-pl-nom see-ps-inf start-pp-MP be-prs-3MP
 'The original forms of modern Nepali short stories have started to appear
 sporadically in magazines'
- (5) (a) *svīTar-ko āḡāDi-pachāRi-ko pāTā joDine lāgeko thiyo (SK 210)*
 sweater-gen front-back-gen side join-ps-inf begin-pp-MS be-pst-3MS
 'The front and back sides of the sweater were beginning to be put together'
 (b) *utarāheko ghar-agāDi-ko kauDā-mā harīyo canā poli utsāh-sāth*
 be-visible-pp house-front-gen sun-in green chick-pea burn-cp enthusiasm-with
 'horhā' tayār garina lāgeko thiyo (SK 53)
 horha ready do-ps-inf begin-pp-MS be-pst-3MS
 'In front of the visible houses, "horhas" were beginning to be readied with
 enthusiasm by baking the green chick peas in the sun'
- (6) (a) *ma-lāi bhok lāḡna thācha*
 me-dat hunger feel-inf start-prs-3MS
 'I am starting to get hungry'
 (b) *ma-lāi rames-ko ghrinā lāḡna khojyo*
 me-dat Ramesh-gen hate feel-inf try-pst-3MS
 'I tried to hate Ramesh'
- (7) (a) *ma-lāi bhok lāḡna lāḡyo*
 me-dat hunger feel-inf begin-pst-3MS
 'I was beginning to get hungry'
 (b) *keTi-lāi jaro huna lāḡyo*
 girl-dat fever be-inf begin-pst-3MS
 'The girl was beginning to get a fever'

Although the Nepali EQUI and subject-raising constructions have these similarities, they also have several syntactic differences. As shown above, both EQUI verbs and *lāḡnu* may appear with

infinitive complements. *lāḡnu* also permits finite complements, as in (8). In this construction, no surface subject of *lāḡnu* appears.

- (8) (a) *kohi āe jasto us-lāi lāḡyo* (SK 99)
 some-nom come-pp as her-dat feel-pst-3MS
 'It seemed to her as though someone had come'
 (b) *mā-lāi māi-le kahī bhul bhanē jasto lāḡena* (SK 191)
 me-dat I-erg some mistake-obj say-pst-1S as feel-pst-neg-3MS
 'It didn't seem to me as though I had said something wrong'

Similarly, *lāḡnu* may appear in noncomplement structures with (9a) and without (9b) a grammatical subject.⁶ The EQUI verbs, on the other hand, always require grammatical subjects; cf. (10).⁷ Thus, *lāḡnu* does not require a grammatical subject, while EQUI verbs generally do in their basic forms. And this distinction carries over to the complement constructions each verb class allows.

- (9) (a) *hāmi ghar lāḡyaū*
 we-nom house set out-pst-1P
 'We set out toward home'
 (b) *rām-lāi bhok lāḡcha*
 Ram-dat hunger feel-prs-3MS
 'Ram is hungry'
- (10) (a) *hāmi-le kām thālyaū*
 we-erg job-obj start-pst-3MP
 'We started the job'
 (b) **kohi āe jasto thāyo*
 some come-pp as start-pst-3MS
 '*There started as though someone had come' (Cf. (1-2).)

Among the examples cited thus far, we can see another difference between EQUI and subject-raising constructions in Nepali. When used in noncomplement structures, EQUI verbs require ergative marking on their surface subjects (11a), while *lāḡnu* requires nominative marking (11b). This suggests that the basic forms of EQUI verbs all subcategorize direct objects and are treated by Nepali speakers as transitive verbs. *lāḡnu*, however, is treated as an intransitive verb in noncomplement structures.

- (11) (a) *rām-le (*-Ø) kām thāyo*
 Ram-erg. (*-nom) job-obj. start-pst-3MS
 'Ram started the job'
 (b) *rām-Ø (*-le) ghar lāḡyo*
 Ram-nom (*-erg) house set out-pst-3MS
 'Ram set out toward home'

In the complement structures we have examined, somewhat different morphological principles apply when the matrix verb is in one of the perfective tenses: Both complement constructions require nominative marking for the matrix subject when the complement infinitive is intransitive (12) or passive (13). Note that in general, both intransitive (14a) and transitive (14b) sentences require nominative-marked subjects. However, when the complement infinitive is transitive, then the morphology of EQUI and subject-raising matrix subjects differs. When the EQUI complement is transitive, then the matrix subject requires ergative marking (15a). But when the subject-raising complement is transitive, then the matrix subject must be marked as nominative (15b).

- (12) (a) *rām-Ø (*-le) ghar jāna thāyo*
 Ram-nom (*-erg) house go-inf start-pst-3MS
 'Ram started to go home'
 (b) *rām-Ø (*-le) ghar jāna lāgyo*
 Ram-nom (*-erg) house go-inf begin-pst-3MS
 'Ram was beginning to go home'
- (13) (a) *keTi-Ø (*-le) Dākina sakina*
 girl-nom (*-erg) call-ps-inf can-pst-neg-3FS
 'The girl could not be summoned'
 (b) *kām-Ø (*-le) garina lāgyo*
 job-nom (*-erg) do-ps-inf begin-pst-3MS
 'The job was beginning to be done'
- (14) (a) *hāmi ghar gayaū*
 we-nom house go-pst-3MP
 'We went home'
 (b) *keTi Dākī*
 girl-nom call-ps-pst-3FS
 'The girl was summoned'
- (15) (a) *rām-le (*-Ø) kām gama thāyo*
 Ram-erg (*-nom) work do-inf start-pst-3MS
 'Ram started to do the job'
 (b) *rām-Ø (*-le) kām gama lāgyo*
 Ram-nom (*-erg) work do-inf start-pst-3MS
 'Ram was beginning to do the job'

Thus, the EQUI construction is 'transitive' or 'intransitive' for the Nepali subject-marking rules depending on the transitivity of the complement infinitive. In the subject-raising construction, on the other hand, *lāgonu* is always considered 'intransitive' for the subject-marking rules.⁸

A third distinction is found between EQUI and subject-raising constructions: Nepali offers both 'intransitive' and 'transitive' dative-subject clauses, as illustrated in (16).⁹ The former (as in (16a)) include only an experiencer NP (*rām*) and a sensation NP (*bhok*). The latter (cf. (16b)) offer an experiencer NP (*rām*), a sensation NP (*man*), and a patient NP (*ti māncheharu*) which controls verb agreement.

- (16) (a) *rām-lāi bhok-lāgyo*
 Ram-dat hunger-feel-pst-3MS
 'Ram got hungry'
 (b) *rām-lāi ti māncheharu man-pardainan*
 Ram-dat those man-pl-nom mind-befall-prs-neg-3MP
 'Ram doesn't like those men'

As illustrated above, both the EQUI (6a) and subject-raising (7a) construction permit intransitive dative-subject clauses as complements. EQUI verbs also permit transitive dative-subject clauses to appear as complements (17). Such dative-subject clauses, however, may not appear as complements in the subject-raising construction (18). But, both EQUI and subject-raising constructions allow similar dative-subject clauses when the 'patient NP' is in a prepositional phrase, as illustrated in (19). Thus, in the EQUI constructions, any dative-subject clause type is permissible. But the subject-raising construction does not permit complements

where the dative-subject 'patient' would control verb agreement in the corresponding finite clause.

- (17) (a) *rām-lāi yi kitāpharu man-pama thālekā chan*
 Ram-dat these book-pl-nom mind-befall-inf start-pp-MP be-prs-3MP
 'Ram has started to like these books'
 (b) *āmā-lāi dherai okhati cāhina thāyo*
 mom-dat much-EM medicine-nom need-inf start-pst-3MS
 'Mother has started to need much medicine'
- (18) (a) **rām-lāi yi kitāpharu man-pama lāge*
 Ram-dat these book-pl mind-befall-inf begin-pst-3MP
 (b) **āmā-lāi dherai okhati cāhina lāgyo*
 mom-dat much-EM medicine-nom need-inf begin-pst-3MS
- (19) (a) *ma-lāi rames-ko ghrinā-lāgna khojyo*
 me-dat Ramesh-gen hate-feel-inf try-pst-3MS
 'I tried to hate Ramesh'
 (b) *ma-lāi tyo kitāp-ko yād-huna lāgyo*
 me-dat that book-gen memory-be-inf begin-pst-3MS
 'I was beginning to remember that book'

In an analysis of EQUI and subject-raising constructions, we want to account for the similarities in the two constructions: Both require infinitival complements and matrix subjects that control verb agreement. And we want to account for distinctions between the two constructions: (1) subject-raising verbs permit finite complements where no matrix subject appears, and nonfinite complements where a matrix subject does appear, and the EQUI constructions only allow the latter form; (2) where the complement clause is transitive, then the EQUI construction is treated as transitive for subject-marking rules while the subject-raising construction is treated as intransitive; and (3) while both constructions allow intransitive dative-subject clause complements, only the EQUI construction permits the transitive dative-subject clause complement.

II. A review of Government & Binding principles¹⁰

Nepali complement structures involve various GB principles of grammar. To simplify the discussion of EQUI and subject-raising constructions, I shall first outline the basics of the GB framework on which the following analysis is based. Let us assume, for the purposes of this section, that the complement structure (20) represents both EQUI and subject-raising clauses.

- (20) [NP_{nom}] +INFL \bar{S} [S [NP* -INFL VP [[NP_{obj}] V-na]]] V (+AGR, +TNS)

The categorial rules of the base (21-22) account for the familiar clause structures of Nepali. Rule (21) accounts for the SOV clause structure of Nepali. Rule (22) accounts for the expansion of this pattern with complement clauses.

- (21) (a) S → NP INFL VP, where INFL includes the features [\pm Agreement], [\pm Tense]
 (b) VP → (NP) V
- (22) (a) NP → (\bar{S}) NP
 (b) VP → (\bar{S}) V
 (c) \bar{S} → (COMP) S

All lexical items are specified for subcategorization features in the base. Such features and the clause structures of (21-22) are retained at each level of grammar as stated in the Projection Principle (Chomsky 1982:29):

(23) Projection Principle

Representations at each syntactic level (i.e. LF, and D- and S-structure) are projected from the lexicon, in that they observe the subcategorization properties of lexical items.

Only one transformation rule is necessary to account for the movement of constituents. Move- α leaves NP-trace in the position from which the affected constituent is moved. Move- α may apply to move elements within all three components of the grammar — syntax, phonological form (PF), and logical form (LF).

The theory of government defines the relationship between the lexical head of a construction and its complements. N, V, A, P, and INFL are governors, and the maximal phrases NP, VP, AP, PP, and \bar{S} are absolute barriers to government. Thus V governs the object NPs it subcategorizes within VP; V-na governs [NPobj] in (20). And +INFL governs the subject NP within \bar{S} ; +INFL governs [NPnom] in (20). Note that -INFL (-TNS, -AGR) is not a governor, and so the subject position of an infinitive complement, NP* in (20), is ungoverned.

Case theory deals with the assignment of abstract Case and its morphological representations. All lexical NPs must be assigned Case at S-structure, or the Case filter will be violated (Chomsky 1982:49); cf. (24). Case is assigned to an NP by the head which governs it within its phrase. Thus the Case rules in (25) hold; cf. (26). Note that -INFL is not a Case-assigner; therefore, in (20), NP* cannot receive Case within the complement clause.

(24) Case Filter

*NP, if NP has phonetic content and no Case.

(25) (a) An NP governed by +INFL is assigned subject Case.

(b) An NP governed by V is assigned object Case.

(c) An NP governed by P is assigned oblique Case.

(d) An NP governed by \bar{V} is assigned dative Case.¹¹

(26) [NPsub] +INFL VP [PP [[NPobj] P] [NPdat] \bar{V} [[NPobj] V]]

hāmi gāu-mā rām-lāi cīThi pāThāuchāu
we-nom village-in Ram-dat letter-obj send-prs-3MP
'we will send a letter to Ram in the village'

θ -theory concerns the assignment in Logical Form (LF) of semantic roles (θ -roles), such as 'agent', 'patient', to NP arguments that have referential value. All positions subcategorized by a lexical head are assigned θ -roles. Complements of V, for example, are assigned θ -roles by the verb. INFL, the nonlexical head of \bar{S} , does not assign θ -roles. Subject NPs may or may not be assigned θ -roles by VP. Generally, where a verb assigns Case to an object NP, then the subject NP receives a θ -role through VP. In LF, and in all other components of the grammar through the Projection Principle, the θ -Criterion must be met (Chomsky 1982:36); cf. (27). As NPs may receive θ -roles through trace, the residue of Move- α , and as the θ -Criterion must be met at D- and S-structures, NPs cannot be moved from or into a non- θ -marked position. Otherwise, the θ -Criterion will be violated.

(27) θ -Criterion

Each argument bears one and only one θ -role, and each θ -role is assigned to one and only one argument.

Binding theory accounts for the relationships between anaphors, pronominals, and referential expressions and their antecedents. An anaphor must be bound with its antecedent within the anaphor's governing category, that is, within a clause containing minimally the anaphor and +AGR or a subject NP. NP-trace is deemed an anaphor. Pronominals are free within their governing categories. And referential expressions, such as names, are free.

PRO, a nonlexical pronoun, is a pronominal anaphor. According to the binding theory, it should be free and bound within its governing category. As it cannot be both, PRO is not subject to binding conditions. The theory of control, however, dictates that the controller of PRO must be contained within the governing category which contains PRO.

Note that PRO and NP-trace are in complementary distribution. Trace must appear in a governed position which is assigned a θ -role; thus, its antecedent must be in a position that receives Case but no θ -role. PRO, on the other hand, may appear in ungoverned positions. Its controller must occur in a position that receives an independent θ -role.

As we can see from these principles, the concept of government is central to GB theory. The government relationships are expressed in D-structure by the subcategorization rules and the Projection Principle, at S-structure by Case theory and the Case Filter, and at LF by θ -theory and the θ -Criterion. The concept of government is also crucial to the analysis of EQUI and subject-raising constructions, as I shall discuss in the next section.

III. The GB analysis of Nepali EQUI and subject-raising constructions¹²

Let us now compare the D-Structures ((a)-sentences) and S-Structures ((b)-sentences) for EQUI (28) and subject-raising (29) constructions.

- (28) (a) NP +INFL \bar{S} [S [PRO -INFL VP [NP V-na]]] V (EQUI)
 (b) [NPsub] +INFL \bar{S} [S [PRO -INFL VP [[NPobj] V-na]]] V (EQUI)
- (29) (a) [NPe] +INFL \bar{S} [S [NP* -INFL VP [NP V-na]]] $\bar{I}a$ -
 (b) [NP*sub] +INFL S [t* -INFL VP [[NPobj] V-na]] $\bar{I}a$ -

Move α does not apply in the EQUI construction (28). V-na in (28) governs and assigns object Case to the NP it subcategorizes. It also assigns a θ -role to [NPobj] at LF.

-INFL in (28) is neither a governor nor a Case-assigner. \bar{S} is an absolute barrier to government of constituents in the complement clause by constituents in the matrix clause. Therefore, the complement clause subject position is ungoverned. No lexical NP can hold this position; otherwise the Case Filter would be violated at S-structure. Thus, nonlexical PRO may appear in this ungoverned position. PRO is assigned a θ -role by VP in \bar{S} . PRO is controlled by the matrix subject NP at LF. Thus, in EQUI constructions, the subject of the matrix clause is the antecedent for nonlexical PRO in the complement clause.

The matrix subject NP in (28) is governed by +INFL. +INFL assigns this NP subject Case. And, this NP receives a θ -role from the matrix VP. Thus, the θ -Criterion is satisfied.

Subject-raising verbs do not assign θ -roles to their subjects. Therefore, no lexical NP may appear as the subject of the matrix clause in the D-structure in (29a), or the θ -Criterion would be

violated. Although the θ -Criterion must be satisfied at LF, the Projection Principle requires it to hold at D-structure as well.

As in (28), V_{na} in (29) governs and assigns object Case to the NP complement in VP. The verb also assigns a θ -role to this NP.

-INFL is a nongovernor and non-Case-assigner. Therefore, NP* in (29) may not appear in the complement subject position at S-structure, or the Case Filter would be violated. If NP* were moved into the matrix-clause subject position by *Move α* , then it would be governed by +INFL and receive subject Case through +INFL. This would satisfy the Case Filter; and the θ -Criterion would not be violated because subject-raising verbs assign no θ -role to the matrix subject.

Move α , however, leaves NP-trace, and NP-trace must be governed. As NP-trace, like NP* in (29), cannot be governed by -INFL, the Government & Binding theory requires that subject-raising verbs induce \bar{S} -deletion. \bar{S} -deletion applies at S-structure (29b) and allows the matrix verb, \bar{I}_{ag} , to govern NP-trace in the complement subject position. Thus, the trace of NP* in (29b) is governed by \bar{I}_{ag} ; it also receives a θ -role from the complement VP which it extends to NP*. The Case Filter and θ -Criterion are thus satisfied at S-structure.

The Government & Binding framework thus distinguishes the EQUI and subject-raising constructions on several grounds: Primarily, subject-raising verbs induce \bar{S} -deletion, and EQUI verbs do not. The subjects of EQUI verbs receive θ -roles from the matrix VP, while those of subject-raising verbs do not. The complement clause subject position is filled by PRO in EQUI clauses, but by NP-trace in subject-raising clauses. In the next section, I shall consider whether these theoretical distinctions account for and explain the differences discussed in Section I between Nepali EQUI and subject-raising constructions.

IV. Predictions of the GB analysis

The first distinction between Nepali EQUI and subject-raising constructions that we noted earlier was that subject-raising verbs permit finite and nonfinite complement clauses, while EQUI verbs permit only nonfinite complements. The explanation for this lies in the assignment of θ -roles to subject NPs and the application of the θ -Criterion.

As the GB analysis of subject-raising clauses indicates, \bar{I}_{agnu} requires no lexical subject. The subject position is not assigned a θ -role by the VP in which \bar{I}_{agnu} appears as verb. Thus, this position need not be filled by a lexical NP, or it may be filled by an NP which receives a θ -role through trace. In either case, the θ -Criterion is not violated. EQUI verbs, on the other hand, assign θ -roles to subjects through VP. Clauses with finite EQUI verbs generally require lexical subjects,¹³ and this NP must control another θ -marked subject NP, PRO in (28).

This theoretical distinction is consistent with the difference between Nepali EQUI and subject-raising constructions. \bar{I}_{agnu} permits both nonfinite (30a) and finite complements (30b). The θ -role of $\bar{r}\bar{a}m$ in (30a) is assigned to the trace of $\bar{r}\bar{a}m$ by the complement VP. The θ -role of $\bar{k}o\bar{h}i$ in (30b) is likewise assigned by the complement VP. In neither example is the θ -Criterion violated, although no θ -role is assigned to the matrix subject position by the matrix VP.

- (30) (a) $\bar{r}\bar{a}m$ $\bar{k}\bar{a}m$ $\bar{g}a\bar{m}$ $\bar{l}\bar{a}g\bar{y}o$
 Ram work do-inf begin-pst-3MS
 'Ram was beginning to do the work'

- (b) *kohi ãe jasto us-lãi lãgyo*
 some come-pp as him-dat feel-pst-3MS
 'It seemed to him as though someone had come'

In EQUI constructions, θ -roles are assigned to matrix subjects by the matrix VP and to the complement subject by the complement VP. Thus, in (31a), θ -roles are assigned to *hãmi*, the matrix clause subject, and to PRO, the nonlexical pronominal anaphor in the complement clause subject position (cf. (28)). The θ -Criterion is not violated in (31a); however, it is violated in (31b) where the complement clause is finite and no lexical NP appears in the matrix clause subject position (cf. (30b)). As the matrix VP in (31b) assigns a θ -role to the subject position and no lexical NP appears in that position, the θ -Criterion is violated and the sentence is ungrammatical. The GB analysis of EQUI constructions predicts that (31b) will be ungrammatical, and that subject-raising verbs will allow both finite and nonfinite complements. Thus the theory accounts for the first distinction between Nepali EQUI and subject-raising constructions.

- (31) (a) *hãmi aba kãm gama thãlchãũ*
 we now work do-inf start-prs-1P
 'We shall start to do the work now'
 (b) **kohi ãe jasto thãyo*
 some come-pp as start-pst-3MS
 '*There started as though someone had come'

The second distinction between *lãgũ* and the Nepali EQUI verbs involved the contrast in (32). EQUI constructions (32a) are treated like transitive clauses for the purposes of morphological subject Case representations, while the subject-raising constructions are treated as intransitive by the same rule despite the presence of a transitive complement clause (32b).

- (32) (a) *rãm-le kãm gama thãyo*
 Ram-erg work do-inf start-pst-3MS
 'Ram started to do the work'
 (b) *rãm-Ø kãm gama lãgyo*
 Ram-nom work do-inf begin-pst-3MS
 'Ram was beginning to do the work'

le-marking in Nepali is sensitive to the frame [NPsub] [NPobj] [V] (Wallace 1985:Chap. II, §2.4.3). Morphological Case representations are assigned in Phonological Form (PF). Therefore, at PF, EQUI constructions should have the structure [NPsub] [NPobj] [V], while subject-raising constructions should have the 'intransitive' structure [NPsub] [VP].

The theoretical distinctions between EQUI and subject-raising in the GB analysis account also for this difference. At S-structure, the input to PF, (32a) and (32b) would appear as (33a) and (33b), respectively. Phonological rules cannot 'see' the features of nonlexical PRO in (33a) (Chomsky 1982:21), but they are sensitive to trace in (33b).

- (33) (a) [*rãm*+sub] +INFL \bar{S} [S [PRO -INFL VP [*kãm*+obj] [*gama*]]]] [*thãl-*]
 (b) [*rãm*+sub] +INFL S [[*t*] -INFL VP [*kãm*+obj] [*gama*]]] [*lãg-*]

At PF, the phonological rule of S-pruning (Hemon 1981) deletes nonbranching nodes. As this process ignores PRO but sees trace, (33a) and (33b) at PF appear as (34a) and (34b), respectively, after S-pruning applies. The subject-raising construction (33b-34b) is unaffected by S-pruning. However, S-pruning deletes the S-boundaries in the EQUI construction (33a-34a). The complement object NP becomes a constituent of the matrix clause at PF.

- (34) (a) [rām+sub] +INFL VP [kām+obj] [gama]] [thā-]
 (b) [rām+sub] +INFL S [[t] -INFL VP [kām+obj] [gama]] [lāg-]

The product of S-pruning for EQUI constructions is a 'transitive' clause structure to which the \bar{g} -marking rule is sensitive. As a result, the morphological representation of subject Case in EQUI matrix clauses is \bar{g} . In subject-raising clauses, the S-boundary cannot be deleted because of trace; therefore no clause union process occurs, as in EQUI clauses. The subject-raising clause matrix subject is thus marked with nominative morphology.

Again, the GB principles correctly predict the distinction found in Nepali grammar. And, the analysis raises an interesting question: If EQUI verbs are transitive in their basic form, why do they not always require ergative marking? The answer, in the GB framework, is that ergative marking is dependent upon syntactic frames and not verb class. As transitive verbs generally subcategorize object NPs, they will usually be found in the appropriate syntactic frame for ergative marking in the perfective tenses.

However, as the analysis of EQUI clauses demonstrates, not all transitive structures are the result of subcategorization features. EQUI verbs subcategorize an NP or \bar{S} , the sentence complement. For the latter structure, S-pruning is necessary for an object NP to appear as a constituent of the matrix clause containing the EQUI verb and so for the ergative-marking rule to apply.

Finally, let us consider the contrast in (35):

- (35) (a) rām-hāi ti kitāpharu man-pama thālekā chan
 Ram-dat these book-pl mind-befall-inf start be-prs-3MP
 'Ram has started to like these books'
 (b) *rām-hāi ti kitāpharu man-pama lāge
 Ram-dat these book-pl mind-befall-inf begin-pst-3MP
 'Ram was beginning to like these books'

As (35) indicates, 'transitive' dative-subject clauses may be complements of EQUI verbs (35a) but not of subject-raising verbs (35b) in Nepali.

In order to account for the contrast in (35), we must first consider the GB analysis of verb agreement and the structure of Nepali dative-subject clauses. Subject NPs, such as those in (36), are governed and assigned Case by +AGR, an element of +INFL. Subject NPs governed by +INFL are co-indexed with +AGR. Where such NPs appear, +AGR is moved onto the verb in PF by Rule-R, producing morphological agreement features on the verb.

- (36) (a) hāmi ghar jānchāū
 we-nom house go-prs-1P
 'We shall go home'
 (b) uniharu-le kām gare
 they-pl-erg work do-pst-3MP
 'They did the work'

As illustrated in (37), the logical subject of dative-subject clauses appears in the dative Case. While these experiencer NPs control other subject properties in dative-subject clauses, the unmarked sensation NP (*bhok*, *man*, and *Dar* in (37)) controls none (Wallace 1985: Chap.IV).¹⁴

- (37) (a) *rām-lāi bhok-lāgya*
 Ram-dat hunger-feel-pst-3MS
 'Ram got hungry' ('for Ram there was hunger')
- (b) *rām-lāi ti kitāpharu man-parchan*
 Ram-dat these book-pl mind-befall-prs-3MP
 'Ram likes these books' ('these books please Ram')
- (c) *rām-lāi bādar-dekhi Dar lāgcha*
 Ram-dat monkey-from fear feel-prs-3MS
 'Ram fears monkeys' ('monkeys frighten Ram')

In a GB analysis of dative-subject clauses, each NP of the dative-subject clause is subcategorized by the verb (Hermon 1981; Wallace 1985). The dative-subject VP then assigns no θ -role to the subject position. This suggests the D-structure (38a) for dative-subject clauses. The verb in (38a) governs the object NPs and assigns θ -roles to them. However, as dative-subject clause verbs are intransitive, they do not assign Case to these NPs. [NPexp] in (38a) receives dative Case from \bar{V} .¹⁵ If a patient NP appears, as [NP*] in (38a), then it cannot receive object Case from the verb. The fact that patient NPs, such as *ti kitāpharu* in (37b), control verb agreement suggests that NP* in (38a) is governed and assigned Case by +AGR.

- (38) (a) [NPe] +INFL VP [[NPexp] \bar{V} [([NP*]) [NPsen] V]]
 (b) [NPe] VP [[NPdat] \bar{V} [[NP*] [NPsen] V+AGR]]

Chomsky suggests (1982:256ff) that languages such as Nepali which do not require lexical subject NPs allow +AGR to be moved onto the verb at S-structure rather than at PF by Rule-R, as indicated in (38b). This allows the subject position to be ungoverned; no lexical NP appears in this position. And +AGR governs any NP governed by the verb to which it attaches through Rule-R. Thus, +AGR in (38b) would govern NP*. (38b) would be the appropriate S-structure for (37b). Thus, at S-structure, *ti kitāpharu* in (37b) (compare with NP* in (38b)) is governed by +AGR. +AGR is a Case-assigner, and so the patient NP of a dative-subject clause may receive subject Case. The Case Filter and θ -Criterion are then satisfied at S-structure.

Let us now apply these principles to the analysis of EQUI and subject-raising clauses like those in (35). In both (35a) and (35b) the complement clause is a 'transitive' dative-subject clause. If this complement clause were a finite clause, the patient NP, *ti kitāpharu*, would control verb agreement as in (37b).

The D-structure of (35b) is represented in (39a). *Move α* applies vacuously in this subject-raising clause, because both the complement and matrix subjects are empty categories not assigned θ -roles; the Case Filter will not be violated if neither of the [NPe]s receives no Case, as both are nonlexical.

- (39) (a) [NPe] +INFL \bar{S} [S [[NPe] -INFL VP [[NPexp] \bar{V} [NP* [NPsen]-V-na]]]] $\bar{I}\bar{a}g$ -
 (b) [NPe] +INFL S [[NPe] -INFL VP [[NPdat] \bar{V} [NP* [NPsen]-V-na]]] $\bar{I}\bar{a}g$ -

The S-structure of (35b) then would be (39b). While the experiencer NP in (39b) may be assigned dative Case by \bar{V} , the patient NP is not governed by a Case assigner. Rule R must apply vacuously in the complement clause, because -INFL contains -AGR, which is not a Case-assigner. Therefore, no element of the complement clause may assign Case to the patient NP; and no constituent of the matrix clause may govern and assign Case to the patient NP because VP is an absolute barrier to government. Thus the patient NP receives no Case at S-structure, and the Case Filter is violated.

In contrast, where the position of the patient NP is filled by an NP in a prepositional phrase, as in (37c), the NP would be assigned oblique Case by the preposition. When such a clause appears as a complement to *lāgnu* in the subject-raising construction (40), then the sentence is grammatical. No NP in (37c) or (40) depends on +AGR for Case assignment; therefore the Case Filter is not violated. Thus the ungrammaticality of (35b) and the contrast between (35b) and (40) follow directly from GB principles of Case assignment and government.

- (40) ma-lāi kitāp-ko yād-huna lāgyo
 me-dat book-gen memory-be-inf begin-pst-3MS
 'I was beginning to remember that book'

In contrast to subject-raising constructions, the Nepali EQUI construction allows dative-subject clauses with patient NPs, as in (37b), to appear as its complement (41a). Dative-subject clauses with prepositional phrase 'patients' may also appear as complements of EQUI verbs (41b).

- (41) (a) rām-lāi ti kitāpharu man-pama thālekā chan
 Ram-dat these book-pl mind-befall-inf start-pp-MP be-prs-3MP
 'Ram has started to like these books'
 (b) ma-lāi rames-ko ghrina-lāgna khojyo
 me-dat Ramesh-gen hate-feel-inf try-pst-3MS
 'I tried to hate Ramesh'

Although (41a) is grammatical, the same theoretical problems arise in its analysis which we encountered in the discussion of subject-raising clauses. The D-structure of (41a) is illustrated in (42a). At S-structure [NPexp] may be assigned dative Case by \bar{V} in (42b); however, NP* is not governed by a Case-assigner. Where Rule-R applies in finite forms of such clauses (37b) and allows +AGR to govern and assign Case to the patient NP, in (42b) Rule-R applies vacuously because -INFL is not a Case assigner.

- (42) (a) [NPe] +INFL \bar{S} [S [[NPe] -INFL VP [[NPexp] \bar{V} [NP* [NPsen]-V-na]]]] thāl-
 (b) [NPe] +INFL \bar{S} [S [[NPe] -INFL VP [[NPdat] \bar{V} [NP* [NPsen]-V-na]]]] thāl-

As discussed earlier, at PF, S-pruning applies to EQUI clauses, deleting non-branching nodes. Also at PF, Rule-R would move the matrix +AGR onto the matrix EQUI verb. This combination could allow the matrix +AGR to govern and assign nominative Case to NP* at PF. However, this would only account for the grammaticality of (41a) at PF; at S-structure, the Case Filter would be violated as with subject-raising clauses.

Even if rules like S-pruning and Rule-R applied at S-structure, VP in the complement clause is still technically a bar to government by constituents outside the VP. To have the EQUI matrix verb in this example induce \bar{S} -deletion and VP-deletion would be a very inelegant solution. And an alternative analysis, that the patient NP is the subject of the dative-subject clause and the matrix EQUI clause, as illustrated in (43), would lose much of the generality in the analysis of Nepali dative-subject clauses (Wallace 1985: Chap. XI, §11.1).

- (43) ti kitāpharu +INFL \bar{S} [S [PRO -INFL VP [rām-lāi \bar{V} [man-pama]]]] thāl-

Thus, the GB analysis does not appear to account for the grammaticality of (41a). Rather than extending this discussion, I simply point out that this is a problem for the basic principles we have examined in this paper, and that a more detailed analysis of such examples will be necessary.

V. Some further thoughts

Although the GB analysis leaves some questions concerning the Nepali EQUI construction, it also suggests an insight into the assignment of θ -roles to experiencer NPs. As observed earlier, the VP which has the constituent lāḡnu assigns no θ -role to its subject in the examples of (44). Yet apparently, the subject NP of (45) is assigned a θ -role.

- (44) (a) ma-lāi bhok-lāgyo
me-dat hunger-feel-pst-3MS
'I got hungry'
(b) rām kām gama lāgyo
Ram work do-inf. begin-pst-3MS
'Ram was beginning to do the work'
(c) kohi ãe jasto us-lāi lāgyo
some come-pp as him-dat feel
'It seemed to him as though someone had come'
- (45) hāmi ghar lāgyaũ
we house set out-pst-1P
'We set out for home'

In contrast, VPs which have as a constituent a member of the class of EQUI verbs do assign θ -roles to their subjects in basic clauses (46a) and EQUI clauses (46b). However, in clauses such as (47), where the EQUI complement is a dative-subject clause, no θ -role can be assigned to the matrix subject position, or the θ -Criterion would be violated. Thus, both subject-raising lāḡnu and the EQUI verbs do not appear to assign θ -roles according to the predictions of the GB analysis.

- (46) (a) rām-le kām thāyo
Ram-erg work start-pst-3MS
'Ram started the work'
(b) rām-le kām gama khojyo
Ram-erg work do-inf try-pst-3MS
'Ram tried to do the work'
- (47) ma-lāi rames-ko ghrinā-lāḡna khojyo
me-dat Ramesh-gen hate-feel-inf try-pst-3MS
'I tried to hate Ramesh'

Two alternative solutions for lāḡnu present themselves. First, examples (44-45) suggest that there are two forms of lāḡnu in the lexicon of Nepali. lāḡnu-A is a motion verb like janu 'to go', which assigns a θ -role to its subject. lāḡnu-B, on the other hand, occurs in the examples of (44) and assigns no θ -role to its subject, as predicted by the GB analyses of lāḡnu complement constructions and dative-subject clauses.

A second possibility is that (45) is a subject-raising construction with D- and S-structures as in (48). This subject-raising analysis requires a non-phonetic verb JĀNU which does not appear in PF. However, the VP including JĀNU would assign a θ -role to hāmi in (48), as in other subject-raising clauses.

- (48) (a) [NP_e] +INFL \bar{S} [S [hāmi -INFL VP [ghar JĀNA]]] lāḡ-
(b) hāmi +INFL S [[I] -INFL VP [ghar JĀNA]] lāḡ-
'We are beginning to go toward home' (cf. (45))

Clearly, more data on such sentences would be necessary before evaluating either of these alternatives as a solution to the distinction between the examples in (44) and (45).

It is unlikely that there are two forms of each Nepali EQUI verb to account for the distinction in (46) and (47). Therefore, an analysis of these examples must provide a unitary account of θ -marking.

One solution would be to treat \bar{V} and VP as equivalent; that is, if an NP, such as an experiencer NP, receives a θ -role through \bar{V} , then the VP of that clause assigns no θ -role to the subject position. Thus, in (46), the VP assigns a θ -role to the subject position; but in (47), no θ -role is assigned to the subject position. Rather, in (47), the \bar{V} assigns a θ -role to the experiencer ma-lāi.

We could extend this analysis of θ -marking beyond the data in (46) and (47) to account for the contrasts in (49-51). In each of these pairs, either the nominative subject would receive a θ -role through VP, or the experiencer NP would receive a θ -role through \bar{V} . Experiencer NPs like those in the (a)-sentences of (49-51) behave very similarly to nominative NPs like those in the corresponding (b)-sentences (Wallace 1985:Chap.IV). An assumption that in each example only one 'subject-like' θ -role would be assigned by VP or \bar{V} , either to the nominative NP or to the experiencer NP, may account for these similarities, especially for LF properties.

- (49) (a) ma-lāi bhok lāgcha
me-dat hunger feel-prs-3MS
'I am getting hungry'
(b) ma bhokāunchu
I-nom hunger-pres-1S
'I am getting hungry'
- (50) (a) ma-lāi jaro cha
me-dat fever be-prs-3MS
'I have a fever'
(b) rām birāmi parcha
Ram-nom sick befall-prs-3MS
'Ram is getting ill'
- (51) (a) keTHāi khusi cha
girl-dat happiness be-prs-3MS
'The girl is happy'
(b) keTi ramri che
girl-d-nom pretty be-prs-3FS
'The girl is pretty'

This analysis of θ -roles also suggests a distinction between the dative-marked NPs in (52a) and (52b). In the analysis of dative-subject clauses, we have assumed that experiencer NPs (rām-lāi in (52a)) were assigned dative Case by \bar{V} , just as are indirect objects (rām-lāi in (52b)). Yet, the θ -roles of these NPs are distinct, and their control properties at LF are distinct as well. Experiencer NPs behave like nominative NPs, while indirect objects behave like direct objects (Wallace 1985:Chaps. III and IV).

- (52) (a) rām-lāi bhok-lāgyo
Ram-dat hunger-feel-pst-3MS
'Ram got hungry'

- (b) mai-le rām-lāi cThi paThāē
 I-erg Ram-dat letter send-pst-1S
 'I sent a letter to Ram'

This analysis suggests that these two classes of NPs are structurally more dissimilar than similar. For example, indirect objects may be subcategorized by appropriate verbs, and assigned inherent Case and a θ -role by the verb, as in (53a) (Chomsky 1982:170-72). On the other hand, experiencer NPs may appear in a different structure where the VP includes \bar{V} as in (53b). In such a structure, the experiencer NP receives dative Case from its governor \bar{V} , and it receives a θ -role from \bar{V} as well. Unlike in (53a), in (53b) VP does not assign a θ -role to the subject position. Thus, assignment of θ -roles to subjects by VP and assignment of θ -roles to experiencer NPs by \bar{V} would be in complementary distribution.

- (53) (a) [NP_{nom}] +INFL VP [[NP_{dat}] [NP_{obj}] dinu ('to give')]
 (b) [NP_e] +INFL VP [[NP_{dat}] \bar{V} [bhok-lāgnu ('to get hungry')]]

This would account for the contrast in the EQUI verb clauses (46-47). In (46), the VP of which the EQUI verb is a constituent assigns a θ -role to the subject position. In (47), the experiencer NP receives a θ -role, and so the subject position does not. Recall that S-pruning makes the complement verb phrase a constituent of the matrix clause, and so the matrix clause would be bound by that θ -role assignment.

NOTES

*The following abbreviations are used in the data:

M	masculine	prs	present
F	feminine	pst	past
nom	nominative	ps	passive
erg	ergative	inf	infinitive
obj	objective	pp	perfective participle
dat	dative	ger	gerundive
obl	oblique	hon	honorific
gen	genitive	Q	question particle
S	singular	neg	negative marker
P	plural	pl	plural marker

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¹The dictionary form of the Nepali infinitive has the suffix -nu. The infinitive in -nu may be used as an NP; -nā is the oblique form of this nominal use. Further information on Nepali complement structures may be found in Wallace 1985:Chap.II and in Wallace 1984.

²Nepali EQUI constructions are discussed in detail in Wallace 1985. The discussion of Nepali EQUI and subject-raising constructions in section I of this paper is based on the information in Wallace 1985.

³It may be that verbs of the EQUI class have various syntactic distinctions among themselves. I shall not explore such distinctions in this paper.

⁴*lāḡnu* has various uses in Nepali, several of which are illustrated in this paper. In addition to being used in the subject-raising construction, *lāḡnu* appears as the verb in dative-subject clauses and in clauses with finite complements.

⁵Neither construction allows an obligational clause as a complement; cf. (a) and (b). (See Wallace 1985:Chap.V.)

(a) *uniharu-lāi din-din kām gamu pama thālyo
 they-pl.dat day-day work do-ger befall-inf start-pst-3MS
 'They started to have to work every day'

(b) *keTā-lāi skul jānu pama lāgyo
 boy-dat school go-ger befall-inf begin-pst-3MS
 'The boy was beginning to have to go to school'

⁶Throughout this paper I shall assume that the sensation NP (*bhok* in (9b)) is not the grammatical subject of dative-subject clauses such as (9b). The sensation NP plus verb phrase appears to be an idiom in Nepali. See the analysis of dative-subject clauses in Wallace 1985: Chap. IV.

⁷This is clearly not always true, cf. (6). Further discussion of this can be found in part V of this paper.

⁸Wallace 1984 discusses this distinction in a Relational-Grammar analysis.

⁹An 'intransitive' dative-subject clause is one which includes as constituents only an experiencer NP and a sensation NP. A 'transitive' dative-subject clause includes another NP, which may appear as a nominative NP or within a prepositional phrase. Nepali makes several important distinctions between these two types of clauses. See Wallace 1985:Chap. IV.

¹⁰The discussion in part II is based on Chomsky 1982. See also Wallace 1985:Chap.X.

¹¹Chomsky (1982:170-72) discusses an alternative rule for dative Case marking: An NP is inherently Case-marked as determined by properties of its [-N] governor. The usefulness of this rule is discussed in part V of this paper.

¹²The analysis in this section is based on Wallace 1985:Chap. IX. For further information see Wallace 1984.

¹³See part V for discussion of examples where this statement is not true. Some EQUI verbs do not assign θ -roles to the subject position.

¹⁴Sensation NPs plus dative-subject verbs appear to form an idiom in Nepali and are therefore treated as units. Chomsky (1982:37) refers to NPs in such idioms as 'quasi-arguments' and assumes they have special rules for θ -marking. They are also probably exempt from the Case Filter, or receive some special Case. The motivation for this analysis is discussed in Wallace 1985.

¹⁵See part V for discussion of θ -role and Case assignment to experiencer NPs.

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CONSONANT MERGER IN NAVAJO:
AN UNDERSPECIFIED ANALYSIS

J. Fraser Bennett*

The Navajo *d-effect* is a phenomenon of consonant merger in which *d* is fused with the initial consonant of an adjacent verb stem. The peculiar forms of these fused consonants may be explained within the framework of underspecification theory: when consonants are viewed as being maximally underspecified in underlying representation, the facts of the *d-effect* and related consonant mergers follow naturally from the underlying representations, a small number of constraints on representations, and facts about Navajo syllable structure. While accounting for the *d-effect*, this analysis has implications for larger questions of Navajo verbal morphology, syllabification, and constraints on representations.

1. Introduction: the *d-effect*.

Vowel merger--for example, the creation of [e] from the fusion of [i] and [a]--is a common process among languages which is currently the subject of a significant amount of research within the framework of autosegmental phonology (Goldsmith 1985, Kaye et al. 1985, Sohn 1987). This paper presents evidence that Navajo exhibits a similar process of merger, known as the *d-effect* in previous descriptions of the language. This merger process affects not vowels, though, but consonants, fusing the underlying verbal classifier prefix *d* with the immediately following consonant.

In this paper I analyze the *d-effect* from the standpoint of underspecification theory, and argue that the results of the *d-effect* mergers follow naturally from the underspecified nature of Navajo consonants in underlying representation (UR). And while the *d-effect* itself has a limited distribution (involving only one prefix in the intricate Navajo verbal morphology), the analysis developed for the *d-effect* merger insightfully accounts for similar effects triggered by the 1st dual subject prefix, as well as for a third class of consonant mergers termed "devoicing effects" in previous work.

The results of this merger appear to be extremely unpredictable. That is, in the examples of the *d-effect* shown in (1), the merging of *d* (phonetically an unaspirated voiceless alveolar stop) with a glottal stop in (1a) results in a glottalized alveolar stop, in some sense a combination of the two stops. Yet when *d* combines with the fricatives *gh* and *z* in (1b-c), the result is in one case a stop, and in the other case an affricate. In (1d) the combination of *d* with a stop produces no visible effect.

(1) *Examples of the d-effect*¹

a.	d + ?	-->	t'
b.	d + gh	-->	g
c.	d + z	-->	dz
d.	d + b	-->	b

Sohn's (1987) analysis of vowel merger in Korean notes that, in the case of vowel merger, it is impossible for any system which uses fully specified feature matrices to extract the features necessary to predict the result of the merger, say, of [i] and [a] as [e], without stipulation. The same is true of consonant merger in Navajo, as can be seen from (1): if fully specified feature matrices are to be merged, it must be stipulated which features are to be retained in the fused form. Furthermore, such stipulation must be made for *each instance of merger*. So in (1b-c), the outcome of the merger is in one case a stop, which "keeps" [-continuant] from *d* and "discards" [-continuant] from *gh*; in the other case an affricate results, in which both [-continuant] and [+continuant] are retained. Moreover, in (1a), the features for place of articulation of the first element, *d*, are retained; in (1b), though, it is the place of articulation of the second element *g* which appears in the fused form.

I would claim, though, that Navajo consonants are *not* underlyingly fully specified feature matrices. Rather, they are highly underspecified in UR, and the consonant which results from the fusion of two consonants is simply the result of combining their underlying forms; that is, the underlying form of a fused consonant is the combination of the underlying forms of the two consonants which were merged. To show how this is so, it will first be necessary to sketch the main points of underspecification theory, as outlined in Archangeli and Pulleyblank (1986); I will then describe the relevant portions of Navajo phonology and Navajo verbal morphology. After a fuller exposition of the relevant data and a consideration of earlier accounts, I will present a system of underspecified feature matrices for Navajo consonants, and show how the majority of the d-effect mergers may be accounted for in this scheme. At the same time I will show how this account of the d-effect also describes the mergers associated with the 1st dual subject prefix. Lastly, I will consider how this underspecified system, together with facts about Navajo syllable structure and restrictions on possible representations, allows an account of four sets of mergers which might appear problematic for this theory of consonant mergers, including the interactions of the 1st dual prefix with the verbal classifier prefixes, and the so-called "devoicing effects."

2. Underspecification theory.

Underspecification theory aims to drastically reduce the amount of information carried by segments in UR by eliminating redundant feature specifications. In this way it attempts to give an insightful, principled account of a variety of phonological processes, for the impoverished underlying representations ought to severely constrain the range of possible rules. As noted above, I will be using the version of under-specification theory developed in Archangeli and Pulleyblank (1986).

I also adopt the Nondistinct Marking Convention of Sohn (1987), which states that "binary use of a feature is prohibited in the underlying representation." That is, only one value for any feature is used in Underlying Representation: [+ F] or [- F] may appear, never both. This increases the poverty of the representations and renders segments only "potentially distinct," since there are no conflicting feature values in UR.

Segments become *actually* distinct only in the course of the derivation, when redundancy rules fill in the values of features for which the underlying representations are unspecified. Archangeli and Pulleyblank (1986) propose that most redundancy rules are not language specific, but given by Universal Grammar. However, a language may select the opposite value as the underlying value for a feature, in which case the appropriate redundancy rule is automatically formed by a principle of Complement Rule Formation.

Thus, if a particular feature [F] has a value [+ F] in underlying representation, there is no contrasting value [- F] in UR. Furthermore, there will be a context-free redundancy rule--either a default rule given by Universal Grammar, or a Complement Rule of the form [] --> [- F]--which will provide the default value at some later point in the derivation. Due to the interaction of the Default Ordering Principle and the Redundancy Rule Ordering Constraint proposed in Archangeli and Pulleyblank (1986), this redundancy rule will activate [- F] at the stratum at which phonological rules first make reference to the value [- F]. These, then, are some of the basic insights of underspecification theory: radical underspecification of underlying forms, the potential distinctiveness of segments, redundancy rules. Other relevant portions of the theory will be introduced as needed.

3. Navajo Phonology

3.1. Navajo Consonants.

In this section I will briefly describe the inventory of consonants in Navajo, the allowable syllable types, and the basic structure of the Navajo verb, the context in which the d-effect appears. In most respects I will follow Wright (1984).

The Navajo consonant inventory is given in (2):

(2) *Navajo Consonant Inventory* (from Wright 1984)

	Voiceless Unaspirated Stop/Affric.	Voiceless Aspirated Stop/Affric.	Voiceless Glottalized Stop/Affric.	VL Cont	VD Cont
Labial	b				
Alveolar	d	t	t'		
	dz	ts	ts'	s	z
Lateral	dl	tʰ	tʰ'	ʃ	l
Palatal	j	ch	ch'	sh	zh
Velar	g	k	k'	x ²	gh
Glottal			ʔ	h	
	Nasals		Glides: y, w, 'y, 'w		
	∅	Glott.			
Labial	m	'm	(<'> indicates glottalization throughout.)		
Alveolar	n	'n			

It is imperative that the series of unaspirated non-continuants--orthographically *b, d, g, dz, dl, j*--not be mistaken for voiced stops and affricates. *They are phonetically voiceless.* Since the vowels are not relevant to the process of consonant merger, I will not treat them. (But note that high tone, which is contrastive in Navajo, is marked as an acute accent, e.g. *d́*, and that long vowels are marked as a sequence of two vowels. Also, nasalization of vowels, also distinctive, is marked by a cedilla, e.g. *j̃*.)

3.2. Navajo Syllables.

(3) shows the three basic syllable types found in Navajo:

(3) *Basic Navajo Syllable Types*

CVC
CVV
CVVC

This admittedly odd inventory of syllable types does not describe the situation entirely. CV syllables are found in certain highly restricted environments, as are V and VV syllables, and certain syllabic consonants. These exceptional types are restricted to word-final position, though, and since the d-effect occurs word-internally I will not deal with them. (There will be one occasion where a V syllable will bear on the d-effect.)

It is important to note that while every consonant in (2) may be syllable-initial, only the alveolar continuants and [h] may generally end a syllable.

(4) *Possible Codas*

s, z, t, l, sh, zh, h

d, n, g, and ? may also be codas, but only in certain word-final contexts. Again, since the d-effect occurs word-internally, these exceptional codas are not relevant here.

3.3. The Navajo Verb.

The Navajo verb has developed something of a reputation for complexity, and deservedly so. Each verb consists of a stem: a verb classifier prefix, which may modify the lexical meaning of the stem or change the voice of the verb; and a variety of prefixes which express subject marking, aspect, mode, and tense, and other functions. The prefixes have different properties with respect to phonological rules; Stanley's (1969) analysis posits a large number of verb-internal boundaries and 12 pre-verbal "slots" for prefixes to account for this, while Kari (1976) reduces the number of pre-verbal slots to 10 and divides the prefixes into "disjunct" (slots 1-3) and "conjunct" (slots 4-10).³ Wright's (1984) modification of Kari's system is given in (5).

(5) *Navajo Verbal Prefixes*

Disjunct			#	Conjunct						[VERB Stem
ADV-ITER-PLUR				OBJ-DEIC-ASP-MODE-PERF-SUBJ-CLASS						
1	2	3	4	5	6	7	8	9	10	
					di	Ø	f	sh	Ø	
					hi	ni		ni	ʔ	
						si		iid	l	
						o		6h	d	

I have reproduced only those prefixes in Wright (1984) which are relevant to forms to be examined, which show the alternations involving the subject and classifier prefixes (positions 9 and 10).

4. The d-effect.

4.1. The d-classifier

Navajo does not retain the Athabaskan verbal classifier prefix *d* in surface forms, although related languages such as Carrier do (see Young and Morgan (1980), p. 355). However, it is relatively clear that that verbs which on the surface appear to have no verbal classifier do not have a "Ø-classifier" (the Athabaskan verbal classifier with no phonological content) in UR. That is, it may be seen that the *d*-classifier remains in Navajo underlyingly because of the "d-effect." In Young and Morgan (1980), the "d-effect" refers to the alternations in the stem-initial consonant of verbs when the verbs take certain prefix paradigms (paradigms distinct from those of the Ø-classifier, in which no alternation is seen). As Coleman (1976) points out in her analysis of Dogrib (a Northern Athabaskan language), to treat these alternations as suppletions would be to miss a large generalization. Moreover, these alternations are identical to the alternations conditioned by the 1st dual subject prefix when it is adjacent to the verb stem. While it would be possible to synchronically narrow the field of possible underlying prefixes, as Coleman does in Dogrib, I will simply note that in Coastal Athabaskan languages such as Carrier, which do not show this alternation, the verbal classifier is visible on the surface as *d*.

(6) Navajo and Carrier d-classifier

Carrier:	nahadna	'it moves'
Navajo:	naha'na	'it moves'

4.2. d-effects: classifier prefix, 1st dual prefix, "non-effects."

Actually, since the d-effect leaves no trace on some consonants, as illustrated in (1d), the characteristic paradigms associated with the *d*-classifier are the only indication of a *d*-classifier in some verbs. These initial consonants on which an underlying *d*-classifier has no surface effect--"non-effects," one might call them--are given in (7), as listed in Young and Morgan (1980). (Young and Morgan (1980), being a descriptive structuralist grammar, simply lists the effects of the *d*-classifier on the following initial consonant of a verb stem.)

(7) Stem-initial Vowels Showing No d-effect

Merger	[Classifier [Stem]	Phonetic Repr.	Gloss
d + b --> b	[d[b]]	-->?adaah yoo b {	'he stripped them off himself'
dz dz	[d[dz]]	-->haas dz í?	'I spoke'
ch' ch'	[d[ch'id]]	-->?ádí ch' id	'he's scratching himself'
t' t'	[d[t'eesh]]	-->?ádír' eesh	'he's blackening himself with charcoal'

d + j	-->	j	[d[jih]-->?ádeesh/jih	'he grabbed himself'
g		g	[d[gish]-->?ádeeshgish	'he cut himself'
k		k	[d[kaad]-->ná?ádookaad	'he slapped himself'

It is immediately apparent that all the consonants in (7) are stops or affricates. That is, all the consonants which are not affected by a preceding *d* are non-continuants. In contrast, consonants which *are* affected by a preceding *d*-classifier are all continuants, with the exception of ?.

(8)-(12) present the effects of the *d*-classifier and the 1st dual subject prefix on the initial consonant of a verb stem in parallel fashion. (8a)-(12a) illustrate the *d*-effects as listed by Young and Morgan (1980), and (8b)-(12b) illustrate the effects associated with the 1st dual subject.

(8)						
a.	d + l	-->	dl	[d[lóós] --> yidlóós	'it is being led along'	
b.	d + l		dl	[d[Ø]ljj?]	siidljj?	'we became'
(9)						
a.	d + gh	-->	g	[d[gháád]	yigáád	'it's being shaken''
b.	gh		g	[d[Ø]gháád]	yiiháád	'we shook it'
(10)						
a.	d + z	-->	dz	[d[zííd]	?ádá yayiidzíd	'he's pouring it for himself'
b.	z		dz	d[Ø]zin]	niidzin	'we think'
(11)						
a.	d + zh	-->	j	[d[zhi?]	yééji?	'he was called'
b.	zh		j	d[Ø]zhee?]	adiijee?	'we spit'
(12)						
a.	d + ?	-->	t'	[d[?j]	yir' {	'he's visible'
b.	?		t'	d[Ø]'áál]	yii' áál	'we're carrying it along'

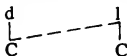
A few observations about the above forms: although the result of most of the mergers (8,10,11) are phonetically affricates, (9) and (12) (repeated from (1b) and (1a), respectively) are not--they are stops; yet one is unaspirated, the other voiceless. (9) and (12) are also exceptional as regards place of articulation: while most of the merged consonants are alveolars, these two in some sense retain the place of articulation of the second element--completely with *g*, in some sense along with alveolar *d* in the case of *t'*. Let us now consider how these forms have been accounted for in the past, and how they may be accounted for in the framework of underspecification outlined in Section 2.

4.3. Past Accounts of the d-effect.

Previous accounts of the d-effect within the generative framework have attempted to deal with it in various ways. Kari (1976), working within the "linear" framework of Chomsky and Halle (1968), proposes a rule which is hierarchical in nature; that is, it selectively applies to change certain features first, then others if the values of the preferred features do not meet the structural description of the rule. Kari's rule also has a transformational component which deletes the *d* if no change has been made (to account for the forms in (7) above). While Kari's rule may seem extremely arbitrary and stipulative, the SPE framework allows no other way to describe the d-effect.

Working within an autosegmental framework, Wright (1984) gives an insightful and interesting account of the d-effect. Wright proposes a rule which would add an association line from the *d* to the following consonant, as in (13). In this way she captures the idea that the d-effect is a combination of *d* with the following consonant.

(13) $d + l \rightarrow dl$ (as in Wright 1984)



Wright's analysis suffers, though, because she is working with an assumption of fully specified feature matrices. She must therefore make stipulations of preferred features in order to predict the phonetic results of the doubly linked C-slot.⁵ However, Wright does recognize the basic similarity of the d-effect and the effects associated with the 1st dual prefix; she also links to the analysis of the d-effect the so-called "devoicing effects" (to be introduced in Section 5.3), a set of forms which show not only devoicing, but also merger in some cases. In this way her work serves to define the body of data which an adequate account of the d-effect must cover.

5. Underspecified Navajo.

Wright's (1984) insight that the d-effect is merging by autosegmental spreading is a valuable one. However, I propose that instead of positing a hierarchical stipulation of which features will dominate in an affricate-structure, the consonant inventory of Navajo be defined in terms of the radical underspecification demanded by underspecification theory. Now, underspecification theory predicts that when two phonemes merge, the product of the merger will be the segment which is represented in UR by the combination of their feature specifications (see Sohn 1987). I therefore turn to the problem of defining a maximally underspecified characterization of the Navajo consonants.

5.1. Feature Defaults and the Consonant Inventory.

Archangeli and Pulleyblank (1986) propose a set of universal default values for features. In themselves these defaults negatively define underlying values for features, and I propose that Navajo consonants are defined in terms of these underlying values with few exceptions. A thorough argument for the particular feature values which Navajo uses in UR would be a task far greater than present space allows, and would require an investigation of a wide range of phonological processes. Instead, I will present a set of underlying feature values which will allow us to account for the d-effects described above, and then show how we may account for the interactions between *-iid-* and the verbal classifiers, the "devoicing effects," and a number of more problematic d-effects within the frame of these underspecified representations. I will take a simple solution to the problem of the d-effect to be, if not proof, substantiation of the choices of UR feature

values. (14) gives default values for the features distinctive in the consonants, and (15) presents a chart giving underspecified feature matrices for the Navajo consonants.

Several features of (14-15) require comment. First, I have not included the features [sonorant] and [distributed], as it is not clear that are distinctive in Navajo consonants. Secondary place features such as [high] and [back] are not included for the same reason.

Second, affricates (such as *ts*, *dl*, and *ch'*) are not represented as doubly linked structures, but as single feature matrices. In fact, underspecification theory demands this, for in a doubly linked structure there must be a sequence of features with distinct values-- for instance, [-continuant] followed by [+continuant]⁶. However, since the Nondistinct Marking Condition of Sohn (1987) prohibits binary use of a feature in UR, such sequences are ill-formed, at least at deeper levels of the phonology. Affricates must therefore be represented, at least in UR, as single matrices. Third, the laryngeals, *ʔ* and *h*, have specifications only for laryngeal features.

Fourth, Navajo takes [+anterior] and [+coronal] as default values. The Navajo default values for [anterior] and [coronal] thus differ from the universal default features which Archangeli and Pulleyblank (1986) propose (namely, [-anterior] and [-coronal]). However, it should be noted that [+anterior] and [+coronal] are the redundant feature values in other theories of redundancy, such as Chomsky and Halle (1968). In any case, the particulars of which feature values are defaults in Navajo does not affect the validity of the major proposals of underspecification theory. What is important is that the system of defaults in Navajo insightfully account for empirical data.

Lastly, there is a special redundancy rule which operates to increase the degree of underspecification in (15). In Navajo, no segment which is [-continuant] is also voiced. We can therefore leave every [-continuant] segment unspecified for [voice] in UR, and fill in the value [-voice] later by means of a special redundancy rule.⁷

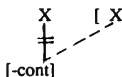
(16) *Special Redundancy Rule*

[] --> [-voice] / [__, -cont]

5.2. Underspecification and d-effects.

Let us now see how the system of underspecified consonants outlined above will account for the d-effects of (8)-(12). First, we must define the rule responsible for the d-effect. Adopting Wright's (1984) insight that the d-effect is caused by spreading of *d* features onto the following consonant, I propose the following rule:

(17) *Consonant Merger*⁸



(17) merges *d* with the following consonant by spreading the features of *d* onto the following timing slot and dissociating *d* from its own timing slot. Since [-continuant] is

(14) *Underlying feature values for Navajo consonants*

<u>Present in UR</u>	<u>Default features</u>
Laryngeal features	
[+voice]	[-voice]
[+constricted]	[-constricted]
[+spread]	[-spread]
Primary Place features⁹	
[-anterior]	[+anterior]
[-coronal]	[+coronal]
Manner features	
[+nasal]	[-nasal]
[+strident]	[-strident]
[-continuant]	[+continuant]
[+lateral]	[-lateral]

(15) *Maximally Underspecified Navajo Consonants in UR*

	<i>Stops</i>							<i>Continuants</i>										
	d	t	t'	b	g	k	k'	ʔ	s	z	ʃ	l	sh	zh	x	gh	h	
<i>Laryngeal</i>	(16)																	
[voice]								-	-	-	-	-	-	-	-	-	-	-
[constricted]								+										
[spread]	+					+							(27)					+
<i>Manner</i>																		
[continuant]	-	-	-	-	-	-	-											
[nasal]																		
[strident]									+	+								
[lateral]												+	+					
<i>P-Place</i>																		
[anterior]					-	-							(26)	-	-			-
[coronal]				-	-	-												-
	<i>Affricates</i>									<i>Nasals</i>								
	dz	ts	ts'	dl	tʃ	tʃ'	j	ch	ch'	m	'm	n	'n					
<i>Laryngeal</i>	(16)																	
[voice]																		
[constricted]																		
[spread]	+																	
<i>Manner</i>																		
[continuant]	-	-	-	-	-	-	-	-	-	-	-	-	-					
[strident]	+	+	+															
[lateral]				+	+	+												
[nasal]										+	+	+	+					
<i>P-place</i>																		
[anterior]							-	-	-									
[coronal]										-	-							

the only feature of *d*, all the features of the other consonant, including place and manner features, will be retained. Furthermore, the result of (17) is not a doubly linked structure but a single feature matrix, for by the Nondistinct Marking Convention of Sohn (1987) no feature in the result of (17) can have distinct values.

We are now in a position to test the proposal I have laid out. (18) shows that the proposal can handle the *d*-effects given in (8)-(12). In each case, the spreading of [-cont-inuant] (the underlying representation of *d*) onto the adjacent timing slot yields a feature matrix which combines the underlying specifications of *d* and the second consonant involved in the merger, and this combined feature matrix is exactly that of the consonant which results from the merger.

(18) *d*-effects with Underspecified Consonants.

a.	d	+	l	-->	dl
	[-cont]		[+lat]		$\begin{bmatrix} +lat \\ -cont \end{bmatrix}$
b.	d	+	gh	-->	g
	[-cont]		$\begin{bmatrix} -ant \\ -cor \end{bmatrix}$		$\begin{bmatrix} -cont \\ -ant \\ -cor \end{bmatrix}$
c.	d	+	z	-->	dz
	[-cont]		[+str]		$\begin{bmatrix} -cont \\ +str \end{bmatrix}$
d.	d	+	zh	-->	j
	[-cont]		[-ant]		$\begin{bmatrix} -cont \\ -ant \end{bmatrix}$
e.	d	+	?	-->	t'
	[-cont]		[+constr]		$\begin{bmatrix} -cont \\ +constr \end{bmatrix}$

So combining the underspecified feature matrices of *d* and the consonants which show *d*-effects gives us exactly the right results--the feature matrices of the fused consonants.

5.3 Configurational Constraints: Prefix Interactions, *d*-effects, and Devoicing Effects.

While the system described so far is able to account for, it will not cover a number of cases related to the more "central" *d*-effects of (8)-(12). These include the interactions between the 1st dual prefix *-iid-* and the verbal classifiers *ʔ* and *l*, the effects of the *d*-classifier on a stem-initial nasal, the "devoicing effects" of Wright (1984), and some miscellaneous effects. I will deal with each of these in turn, showing how the configurational constraints proposed in Archangeli and Pulleyblank (1986) allow us to account for each while maintaining the framework of underspecification developed in Section 5.1 - 5.2.

As a means of capturing further redundancies in the phonological system of a language, Archangeli and Pulleyblank (1986) propose that there may be language-specific constraints on the content of feature representations--on which features must cooccur within a segment, and which cannot. These constraints on what features may be

associated together may be positive ("c-constraints," which state that "feature F can be connected to a segment X only if X is connected to feature G"), or negative ("c̄-constraints," of the form "feature F *cannot* be connected to a segment X if X is connected to feature G"). Although Archangeli and Pulleyblank allow that a configurational constraint might be removed at some (higher) level in the lexical phonology, they conceive of these configurational constraints as constraints on representations which hold at all earlier levels. I propose that the restraints on the system proposed above which are needed to account for the more "problematic" d-effects may be formalized in terms of several configurational constraints.

5.3.1. d-effects on Nasals.

Now, let us consider the effect of a *d*-classifier or the prefix *-iid-* on an adjacent stem-initial nasal. In (19) we see that the result of *d* merging onto a stem-initial nasal is a glottalized nasal.

(19) *Effects of d-classifier and 1st dual subject prefix on Stem-Initial Nasal*

a.	d + m	-->	'm	[d[maat]-->'ii'maat	'they're being bolted down'
	d + m	-->	'm	[d[Ø[mas]-->'yii'mas	'we're rolling it'
b.	d+ n	-->	'n	[d[niŋ]-->ná'niŋ	'they were brought back'
	d + n	-->	'n	[d[Ø[nf]-->dii'ní	'we say it'

However, this outcome is not predicted by the system of underspecified segments and defaults outlined in (14)-(15). The fusion of *d* with *m* "ought" to be a consonant which in UR combines the underlying features of *d* (i.e., [-continuant]) and *m* ([+nasal,-coronal]). In fact, though, the intersection of these two sets conspicuously lacks the feature [+constricted], which encodes glottalization.

I propose that this difficulty may be explained if nasals in Navajo are regarded as continuants. (In fact, the chart of UR consonant specifications in (15) assumes this.) In addition, I propose that in Navajo there is a positive configurational constraint which interprets a nasal which becomes non-continuant in the course of a derivation as glottalized. This may be formalized as a c-constraint which requires that any segment which is [+nasal] and [-continuant] also be [+constricted], as in (20).

- (20) *C-constraint:*
 [+constr] must be attached to X if X is attached to [+nasal, -continuant]

So in the derivation of *'ii'maat* (19a), *d* fuses with *m* by rule (17) and the feature [-cont] is added to the feature matrix of *m*. The combined underspecified feature matrix is thus [-cont, +nasal, -coronal]. This structure is not permitted by c-constraint (20), though; by (20), [+constr] is added to the feature matrix of the fused consonant, and the segment is realized as *'m*. So the system we have developed so far can be constrained just enough to account for the d-effects on nasals by a configurational constraint. I will next describe how configurational constraints can account for the interactions between the 1st dual prefix and verbal classifiers and Wright's "devoicing effects."

5.3.2. Interactions between *-iid-* and Verbal Classifiers.

While the merger rule in (17) refers to a morphological bracket between *d* and the consonant with which *d* fuses, (17) does not require this bracket to be the verb stem boundary. This is because the 1st dual subject prefix *-iid-* interacts with the verbal classifiers *t* and *l*. The interactions are shown in (21). However, the outcome of these mergers is not predicted by the framework of (14)-(15).

(21) *Interactions between 1st Dual Subject Prefix and Verbal Classifiers l and l (as in Wright 1984)*

- | | | | | | |
|----|-------|-----|---|--------------------------|----------------------|
| a. | d + t | --> | l | [d][h[ghozh]-->yii/ghozh | 'we tickle him' |
| | d + t | --> | l | [d][h[baal]-->dii/baal | 'we hang it' |
| b. | d + l | --> | l | [d][l[ghal]-->yii/ghal | 'we eat it (meat)' |
| | d + l | --> | l | [d][l[deel]-->yii/deel | 'we start to eat it' |

The forms in (20) are particularly odd, since the "normal" d-effect between *d* and a lateral (as in (8)) produces an affricate, *dl*. Furthermore, fusing *d* with voiceless *t* produces a voiced *l*. This is also odd, as the merger between *d* and *l* in (8) produced *dl*.

One of the central insights of Wright's (1984) autosegmental analysis is that the segments in Verbal Slots 8 and 9--the subject prefixes and the verbal classifiers--are assigned to the same timing slot. Wright argues that Navajo requires the verbal stem to be preceded by at least one syllable to "carry" the prefixes, and proposes that the "unmarked" form of this pre-stem syllable (the form which appears when, say only a consonantal subject prefix such as *sh-* is present and a syllable must be constructed) is CVC. The prefixes which occupy Slots 8 and 9 in the verb are both assigned to the final C-slot of this pre-stem syllable.

Thus, in the derivation of *yii/ghal* (21b), the segments of the underlying representation are mapped onto syllable templates, and in the process, the underlying *d* of the 1st dual prefix and the *l*-classifier are both mapped to the coda position of the pre-stem syllable. We would expect this structure to surface as *dl*, just as the mapping of the classifier *d* to the skeletal slot occupied by stem-initial *l* yielded *dl* in (8). (22) shows this structure. (I assume that the onset and nucleus of the pre-stem syllable are later filled in by rule, as Wright proposes.)



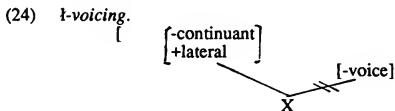
It was stated in Section 3.2, though, that non-continuants cannot be the coda of a syllable. This condition on Navajo syllable structure may be expressed by a negative configurational constraint, (23):¹⁰

- (23) \bar{C} -constraint:
[-continuant] cannot be connected to a segment X if X is in coda position.

In the syllabified structure in (22), though, [-continuant] is linked to a coda position, forming a structure which is disallowed by \bar{c} -constraint (23). [-continuant] is therefore delinked from the coda slot, leaving only *l* in that position; and after construction of the pre-stem syllable, the surface form of the verb is the correct *yilghal*.

While the above account of *d* fusing with the *l*-classifier is quite elegant, the merger of *d* with the voiceless classifier *t* is not so neat. In (21a), *-iid-* combines with *t* to give *l*. By the account of *d* + *l* above, it is not mysterious that *d* + *l* does not yield an affricate: the account developed so far would predict that when *d* and *t* are combined in a structure like (22), the combined feature matrix linked to a coda position--[-continuant, +lateral, -voice]--will be disallowed by \bar{c} -constraint (23), and [-continuant] will therefore be delinked. However, this leaves the feature matrix [+lateral, -voice], which ought to surface as voiceless *t*, not as voiced *l*.

In fact, nothing in the account developed so far will explain this voiced *l*, and to account for it we must posit a feature-changing rule. While this does detract from the elegance of the system, it does not discount our basic approach. Underspecification theory should reduce the number of feature-changing rules needed in a system, but it does not disallow such rules. (It may be some comfort that Kari also posited a rule of *t*-voicing.) (24) gives a formulation of the rule required to voice *t* in these contexts.



The effect of (24) is to delink [-voice] from the structure which results when *d* and *t* are both mapped to the pre-stem coda in the derivation of *yilghozh*. Notice that (24) is not actually a feature changing rule, but a feature *deletion* rule. I propose that after the application of (24), [-continuant] will also be delinked because of \bar{c} -constraint (23), leaving only [+lateral] linked to the coda position. This will give the correct surface form.¹¹

5.3.3. "Devoicing Effects."

Wright (1984) refers to a set of interactions between the verbal classifiers *l* and *l* and the 1st singular and 2nd dual subject prefixes, which she calls "devoicing effects." These "devoicing effects" are given in (25).

(25) *Devoicing Effects (1st sg./2nd Dual Subject Prefixes and Lateral Verbal Classifiers)*

- a. sh + *t* --> sh [sh{t}ghozh-->yishxosh 'I tickle'
- b. h + *t* --> t [oh{t}ghozh-->wohxosh 'you (dual) tickle'

(25) *Devoicing Effects (cont.)*

- c. $sh + l \rightarrow sh$ [sh[l[zheeh]] \rightarrow haashzheeh 'I hunt it'
 d. $h + l \rightarrow \text{ɬ}$ [oh[l[sheeh]] \rightarrow haotzheeh 'you (dual) hunt it'

Like the above interactions between *-iid-* and the verbal classifiers, the analysis of these devoicing effects hinges on the insight that both are assigned to a single coda position. And as in the last section, configurational constraints are required to restrict the possible outcomes of consonant mergers. The two \bar{c} -constraints which are needed are given in (26)-(27).

- (26) \bar{c} -constraint.
 [+lateral] cannot be connected to X if X is connected to any PLACE feature.
 (27) \bar{c} -constraint.
 [+spread] cannot be connected to X if X is connected to [+lateral].

\bar{c} -constraint (26) prohibits [+lateral] from being connected to an X-slot which has place features in UR, i.e., to any segment other than an alveolar. The constraint is not unreasonable a priori: cross-linguistically, laterals are generally alveolar, and Sapir and Hoijer (1967) make no mention of velarized laterals in their discussion of Navajo phonetics¹². (26) is responsible for the fusions in (25a,c), $sh + \text{ɬ} \rightarrow sh$ and $sh + l \rightarrow sh$, by prohibiting any non-alveolar segment to be a lateral in UR. (28) shows the features involved in the merger $sh + l \rightarrow sh$:

- (28). $sh + l \rightarrow sh$
 $\begin{bmatrix} -\text{voice} \\ -\text{ant} \end{bmatrix} + \begin{bmatrix} +\text{lat} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{voice} \\ -\text{ant} \\ +\text{lateral} \end{bmatrix}$

Merging the features of *sh* and *l* creates a lateral palatal matrix. However, [+lateral] is barred from being connected to a [-anterior] segment by \bar{c} -constraint (26). The delinking of [+lateral] results in a matrix [-anterior, -voice] which surfaces as *sh*. The derivation of *sh* from $sh + \text{ɬ}$ is similar.

(27) bars [+spread] from being part of a segment with [+lateral]. In analyzing the other two devoicing effects (25b,d), we wish to capture the generalization that when *h* fuses with a lateral, the lateral acquires the [-voice] of *h*, as illustrated in (29).

- (29)a. $h + l \rightarrow \text{ɬ}$
 $\begin{bmatrix} +\text{spread} \\ -\text{voice} \end{bmatrix} + \begin{bmatrix} +\text{lat} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{lat} \\ -\text{voice} \\ +\text{spread} \end{bmatrix}$
 b. $h + \text{ɬ} \rightarrow \text{ɬ}$
 $\begin{bmatrix} +\text{spread} \\ -\text{voice} \end{bmatrix} + \begin{bmatrix} +\text{lat} \\ -\text{voice} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{lat} \\ -\text{voice} \\ +\text{spread} \end{bmatrix}$

While the above mergers express the devoicing of the laterals, they yield feature matrices which are lateral and [+spread]--a segment which is not defined in UR. (27) ensures that in such a case as (29), [+spread] will be delinked, leaving only the voiceless *l*.

5.3.4. Problematic d-effects.

There remain three problematic d-effects, which are illustrated in (30).

(30) Problematic d-effects.

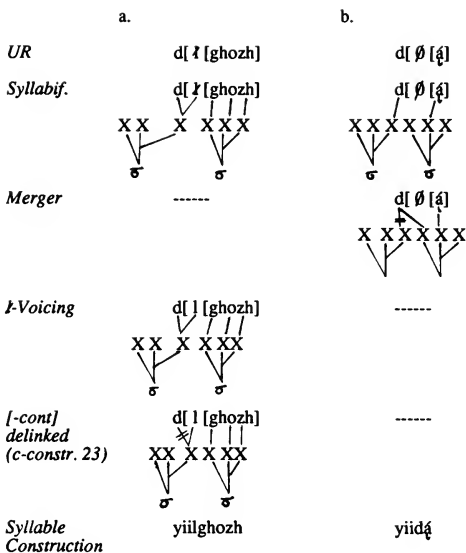
- | | | | | | |
|----|-------|-----|----|--|----------------|
| a. | d + y | --> | 'y | [d[θ[yóf]-->t'óó'ahoni'yóf | 'we are many' |
| b. | d + y | --> | d | [d[θ[á]-->yiiḏá | 'we eat' |
| c. | d + z | --> | d | [d[θ[zeez]-->yiiḏeez
(cf. yizeez, "he singed it") | 'we singed it' |

(30a,b) present an obvious problem, if one looks at only the consonants involved: in one case *d + y* yields 'y, in another case *d*. However, I follow Wright (1984) in analyzing the two stems in (30a,b) as having different initial segments in UR. That is, I suppose that the underlying verb stem in (30a) is *yóf*, with initial *y*, while in (30b) the stem is vowel initial, *á*. I propose that the combination of *d* and *y* gives 'y, much as the combination of *d* and *m* gave 'm in Section 5.3.1. At this point I will not propose a c-constraint which would predict this, though, for the following reason: there is some evidence in Wright (1984) that the occurrence of the vowel *i*--at least in the conjunct prefix system--is very predictable, and need not be represented in UR. Thus, Wright (1984) analyzes most occurrences of *y* as an underlying *i* which has been linked to an onset or coda syllable position. This suggests that the stem-initial *y* of (30a) is actually *i* in UR. A proper formulation of the c-constraint ensuring that *d* and *y* combine to form 'y would therefore require an underspecified analysis of the vowel system of the Navajo verb, which I will not undertake at this point.

In contrast, the stem in *yiiḏá* (30b) is vowel initial *á* in Wright's (1984) analysis. Wright does not explicitly discuss this case, but I believe her general analysis can be made explicit in the in the system outlined above. I propose the following derivation for *yiiḏá*: Since the usual syllable type in Navajo is CVC, when the UR forms are mapped onto the syllabified skeleton, the stem *á* is mapped onto the nucleus position of a CVC template. When the rule of Merger (17) applies, the 1st dual prefix *d* is linked to an otherwise empty timing slot in syllable-initial position, and so is realized as *d* on the surface. (This exceptional case of prefix *d* appearing as *d* is the motivation for the Merger rule's formulation in (17) as not showing the stem-initial timing slot linked to any feature content.) To illustrate, I present derivations for *yiiḏghozh* (21a) and *yiiḏá* in (31). In (31), the system of underspecification and configurational constraints (plus the rule of *l*-Voicing) is able to derive the correct surface form. (Syllable Construction fleshes out the pre-stem syllable at the end of the derivation; its exact formulation is beyond the scope of this paper, but note that the syllable is fleshed out with an *i* vowel and a *y* onset.)¹³

At present I have no real explanation for the third problematic merger, *d + z --> d* (30c). However, I would point out that this is an extremely rare merger, and not productive. Since this is the case, it seems possible that *d + z --> d* is a case of suppletion or allomorphic variation; i.e., the *d*-classifier forms of the root *zeez*, "to think, believe," have the form **d-deez* in UR, presumably as a result of some historical process.

(31)



6. Conclusions.

Accounts of vowel merger from an underspecified approach (such as Sohn 1987) have succeeded in describing vowel fusion as the combining of the underlying features of radically underspecified segments. I have shown above that the d-effect in Navajo, a process of consonant merger, may also be described in terms of the theory of underspecification. That is, when consonant fusion is taken to be a similar sort of combination of the feature specifications of consonants in UR, most of the consonants which result from the d-effect can be predicted from the underlying features of their component parts. Those instances of fusion which are not simple combinations of features in UR can be described if we adopt one feature-changing rule (*l-Voicing*) and four configurational constraints. In this way, underspecification theory offers an account of the d-effect which is both elegant and explicit. In return, the extension of the theory's application to consonant mergers lends support to the overall theory.

At various points in the above analysis issues of Navajo syllable structure and morphology have been raised. It is clear that the analysis of the d-effect is only one part of a larger generative treatment of Navajo, but a proper account of the d-effect is essential if these issues within Navajo are to be addressed. It appears that an underspecified analysis of the Navajo vowel system, and an analysis of the Navajo verbal system from the standpoint of lexical phonology, would be especially fruitful. In this analysis, though, larger questions of phonological theory, such as syllabification processes, the formulation of phonological rules, and the nature of configurational

constraints have been only hinted at, and I have mostly avoided these larger issues. Navajo is a language of stunning morphological complexity, though, and a closer analysis of Navajo from the standpoint of current phonological theory will certainly raise many interesting and challenging problems for that theory.

NOTES

*I would like to thank Dr. Charles Kisseberth for valuable comments on an earlier draft of this paper; also, thanks to Hyang-Sook Sohn, for introducing me to underspecification theory and reassuring me that Navajo isn't really bizarre. Remaining faults are of course my own. SDG.

²The Young and Morgan orthography uses <h> for both [h] and [x]. The allophonic variations of these consonants are somewhat controversial, and I will distinguish them.

³It appears that the Navajo verb might be well described in terms of lexical phonology: Kari's groupings of "conjunct" and "disjunct" prefixes bear some resemblance to two different strata. I am not aware of any work on this topic, though, and will only allude to possible results of such an analysis.

⁴Wright (1984) actually proposes to eliminate *i* vowels from the underlying representation of prefixes. This is a stimulating proposal from the standpoint of underspecification theory, but it is not directly relevant to the *d*-effect.

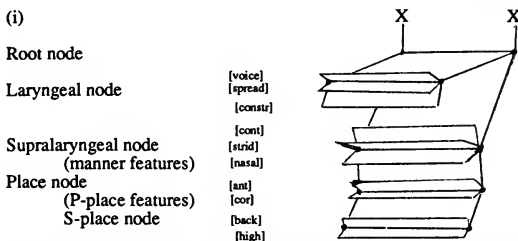
⁵The solution which Wright (1984) proposes utilizes a version of structure preservation, or rather, "structure rectification." As she sees it, two consonants linked to a single C-slot "compete" for the position. A Coda Hierarchy determines which features will be realized, and this hierarchy acts always to mold the consonants into an allowable affricate. Wright proposes to account for the effects of the *d*-classifier and the 1st dual prefix in this way, as well as for the interaction of the 1st dual with the verbal classifiers. Wright's proposal incorporates valid insights, such as the fact that syllable structure plays a role in determining allowable surface forms. However, she does not elaborate the strong theoretical claims of her proposal; nor does the Coda Hierarchy give correct results for the merger *d + t --> l*.

⁶Assuming, that is, the Obligatory Contour Principle of McCarthy (1981), which prohibits two adjacent occurrences of a feature on a tier.

⁷In (15) the glottal consonants *ʔ* and *h* are specified [-voice]. It would be possible (and probably desirable) to attribute this to another special redundancy rule of the form. The exact formulation of this rule is uncertain, though, since it must refer to those segments features which are distinguished by *not* having specifications for supralaryngeal features. Furthermore, this would create a distinction in UR between "zero" (a feature which has not yet been filled in by a default) and "nothing" (a feature for which a segment receives no specification at all), for *ʔ* would be distinguished from *t'* only in being specified as [+constricted] (with no supralaryngeal features at all), whereas *t'* is specified as [+constricted, -continuant], with supralaryngeal features to be filled in later. While this has implications for the formulation of rules, they which are beyond the reach of the present study. (For "supralaryngeal features," see Note 9.)

⁸The rule of Consonant Merger must be formulated so that it will apply only to segments whose only feature is [-continuant], and not [-continuant] and some other feature. While this has implications for the theory of rule formalism proposed in Clements (1985), I will not pursue the matter.

⁹"Primary place" (P-place) and "Secondary place" (S-place) are terms drawn from the theory of feature geometry described in Clements (1985), in which the various autosegmental tiers which bear the features are organized into a tree-like structure. (i) shows the modified tree structure presented in Archangeli and Pulleyblank (1986).



In this paper I loosely adopt this conception, since it allows a simple formulation of configurational constraint (26). Otherwise, feature geometry does not crucially affect rule formulation, and I will not pay strict attention to it.

¹⁰Michael Kenstowicz has observed to me that this constraint may be viewed as a requirement that the default feature [+continuant] appear in coda consonants on the surface. In this way Navajo parallels and contrasts with Korean, for in Korean coda consonants must be [-continuant], and the default value is [-continuant] (see Sohn 1987).

¹²My analysis crucially assumes that the rule of $\dot{\bar{t}}$ -Voicing (24) can refer to the banned matrix [-cont, +lat, -voice]--i.e., that c-constraint (23) does not destroy the crucial environment for rule (24) before (24) applies. While this bears on questions of how configurational constraints apply in the derivation, I will not pursue them. I should also note that my use of configurational constraints hinges on the assumption that a violated configurational constraint does not simply block the derivation. In my analysis, then, configurational constraints capture explicitly Wright's somewhat vague processes of "structure rectification" (see note 5).

¹³I assume that \bar{c} -constraint (26) would be removed at some point in the derivation to allow laterals to receive default place features.

¹⁴These pre-stem syllables and their form have implications for the theory of syllabification as proposed by Levin (1985) and expanded by Archangeli and others. This would be an interesting area for further investigation.

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THE SIGNIFICANCE OF CODE-MIXING TO LINGUISTIC THEORY:
Evidence from Bantu Languages*

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This paper argues for the inclusion of code-mixed and other multidialectal and multilingual facts and for a reconceptualization of linguistic competence vis-a-vis multilinguals in the formulation of syntactic theories. Drawing on a few code-mixed sentences involving two Bantu and two Indo-European languages (viz., Lingala, KiSwahili, French, and English) as an example of multidialectal and multilingual data, the paper argues that the speech of code-mixers represents the externalization of the (internalized) bilingual's grammar and that this knowledge must be accounted for by any theory of language in general, and syntax in particular. It is suggested that the inclusion of language varieties in syntactic investigations will not only expand the data-base upon which insightful conclusions can be drawn about what constitutes language knowledge, but will also benefit linguistic theory. The paper contends that the current syntactic theories are formulated on a very narrow domain to allow for an adequate account of knowledge of human language. A reconceptualization of the internal organization of multilingual grammars is suggested and its implications for syntactic theory are examined.

1.0 INTRODUCTION

Since its advent in 1957, generative transformational theory has purported to be the study of "what one knows when one knows a language: that is, what has been learned, as supplemented by innate principles" (Chomsky 1986: 24). This study of the language faculty, whose ultimate objective is to formulate a theory of linguistic knowledge, has focused attention on four basic questions (cf. Chomsky 1965, 1980, 1982, 1986, Labov 1972, Bresnan 1978, 1982, Kaplan & Bresnan 1982, Riemsdijk & Williams 1986):

- (1) a. What are the universal properties of human language?
 b. What constitutes knowledge of language?
 c. How is knowledge of language acquired?
 d. How is knowledge of language put to use?

In spite of the proliferation of syntactic and phonological theories in the past six years or so, this research goal has remained constant. The approaches and therefore the answers to the questions in (1), however, have varied considerably. For instance, while sociolinguistics has attempted to address these questions by examining data from both the performance and competence aspects of language competence (Labov 1970, 1972, Ervin-Tripp 1970, Hudson 1980, Trudgill 1983) or what Chomsky (1986) terms "Internalized" (I-) and "Externalized" (E-) language, research in phonological and syntactic theories has focused primarily on competence/I-language. As a result, synchronically invariant language has generally been taken as the sole basis of theoretical development; multilingual and variant monolingual data have been excluded from consideration in the formulation of such theories.

1.1 Code-mixed data & linguistic description. The exclusion of dialectal and multilingual data as possible objects of linguistic analysis raises serious questions about the adequacy of current theories in accounting for linguistic knowledge, viz., in answering questions (1b-d). Consider, for example, the sentences in (2) and (3) from Bantu languages:

(2) KiSwahili-English (KE):

- a. Ni-na-m-provoke kila wakati tu-ki-kutana naye. (Scotton
 I-Pres-OM-provoke each time we-TA-meet with him 1983)
 (I provoke her every time if we meet with her)
- b. Ni nani a-li-i-spoil kamba yetu? Iko short sana..
 Is who 3rdSg-pst-OM-spoil rope ours it's short very
 (Who spoiled our rope? It is very short...)
 (Scotton, id.)

(3) Lingala-French (LF)

- a. Soko a-compren-aki yo te a-kok-aki ko-ndima te.
 If he-understand-Impf you not he-can-Impf to-agree not
 If he did not understand you, he would not have agreed.)
- b. Ba-garçons wana ba-zo-mi-défendre kaka mpamba.
 Pl-boys there they-be-OM-defend just for nothing
 (Those boys are arguing (in self-defense) just to save
 face.)

These sentences, which are representative of code-mixed speech commonly heard in the Eastern and Central African countries where the language pairs are spoken, cannot be explained adequately within the current theories of generative grammar. To account for the derivation of any of these utterances in one of these theories, for example Government and Binding (GB), one will have to modify the theory in several important respects.

1.2 Purpose and scope of the study. It will be argued in this paper that code-mixed facts such as (2) and (3) above represent the externalization of the linguistic competence of the bilingual speaker (hereafter the bilingual's grammar) and that this knowledge must be explained by any theory of language. Code-mixed data drawn from Bantu languages are used to motivate an analysis of the bilingual's grammar, and its implications for linguistic theory are discussed. It is suggested that the use of multi-dialectal and multilingual data is a necessary extension of the domain of linguistic analysis if generative theory is to become a true model of the speaker's knowledge of language.

The discussion begins with a brief characterization of code-switching, and moves on to a critical review of general linguistic and code-switching theories in light of data from Up-country Swahili and Kinshasa Lingala (KL). It concludes with an analysis of the bilingual's grammar and its significance to syntactic theory. We will focus our attention on GB and its immediate predecessors (Standard & Extended Standard Theory) under which most code-mixing studies have been conducted.

2.0 CODE-MIXING, LINGUISTIC DESCRIPTION & LINGUISTIC THEORY

2.1 Overview of code-switching. Code-switching (CS), generically defined as the alternating use of linguistic units from two or more distinct languages (cf. Lipski 1978, Kachru 1978, Sridhar & Sridhar 1980), has been one of the dominant topics of sociolinguistic research for the last sixteen years or so. Recently the phenomenon has attracted the attention of syntacticians of various persuasions (cf. Sridhar & Sridhar 1980, Sankoff & Poplack 1981, Di Sciullo et al. 1982, Woolford 1983, Joshi 1983, Bokamba 1985, Ewing 1985), but its fundamental characteristics remain poorly understood.

Strictly speaking, CS consists of two distinct sub-phenomena referred to as code-switching proper or intersentential switching and code-mixing (CM) or intra-sentential switching. The former is defined in (4) and the latter in (5):

(4) Code-switching is the embedding of words, phrases, and

sentences from two codes across sentence boundaries within the same speech event (Bokamba 1985: 3).¹

- (5) Code-mixing is the embedding of various linguistic units, i.e., morphemes, words, phrases, and clauses from two distinct grammatical systems or sub-systems within the same sentence and speech event (Bokamba 1985: 4).¹

The difference between the two phenomena is illustrated in (6) and (7), where the former is a code-switched discourse, and the latter, a code-mixed utterance:

(6) Lingala-French:

Boni, Beya, osili kozonga! Tu rentres comme-ça sans me prévenir? (Bokamba 1985)

Well, Beya, you are already back! You return (just like that) without warning me?

(7) KiSwahili-English:

Ile accident ilitokea a-li-po-lose control na a-ka-overtun and landed in a ditch (Abdulaziz 1972)
(The accident occurred when he lost control and over-
turn...)

In this paper we are primarily concerned with CM, but our conclusions can equally be applied to CS proper.

CM continues to be a fascinating topic in linguistic and psycholinguistic research for three main reasons: (1) initial and continuing misunderstanding of the general phenomenon of CS; (2) paucity of cross-linguistic studies on the phenomenon; and (3) the implications that the mixed data have for the characterization of the internalized grammar of the bilingual speaker.

Initially, CS was seen as a verbal behavior that is symptomatic of language deficiency on the part of the speaker. The phenomenon was, therefore, characterized as random and non-rule governed (cf. Gumperz 1970, Gumperz & Hernandez 1972, Abdulaziz 1972, Timm 1975). Since the late 1970s, however, it has become evident that CS and CM are rule-governed phenomena that reflect the bilingual's linguistic creativity (Kachru, 1978, Lipski 1978, Pfaff 1979, Poplack 1980). As a general phenomenon, CS is governed socio-psychologically and structurally. It is socio-psychologically governed in the sense that switching is typically triggered by the context of the situation for identifiable social and psychological functions (Scotton & Ury 1977, Wentz 1977, Jacobson 1978, Kachru 1978). The phenomenon is structurally governed in that the resulting utterances are constructed according to the rules of the language pair concerned (Lipski 1978, Pfaff 1979, Poplack 1980,

Sridhar & Sridhar 1980, Sankoff & Poplack 1981, Kachru 1982, Di Sciullo, Muysken, & Singh 1986).

In spite of this gain in our understanding of CS, the basic linguistic and psycholinguistic characteristics underlying it remain poorly understood. This inability is ascribable to the paucity of cross-linguistic studies on CS, on the one hand, and to the narrowness of the domain of linguistic investigation in generative grammar, on the other. The vast majority of the studies published on CS have been based on Spanish-English bilingualism, with a few others on similar Indo-European language-pairs (e.g., French-English, French-Italian, Greek-English, German-English, etc.). Studies based on non-Western languages are few (cf. Ure 1972, Abdulaziz 1972, Bautista 1975, Annamalai 1978, N'Sesep 1978, Sridhar and Sridhar 1980, Kachru 1982, Bokamba 1985, 1987, Kamwangamalu 1987a, and forthcoming). As a result, the conclusions drawn from code-mixed data in Western languages are much less generalizable than the literature has led us to believe, and are therefore flawed in their characterization of the phenomenon.²

Even if cross-linguistic research on CS were to be undertaken extensively, the insight that such work might shed would continue to be limited as long as researchers confine themselves to the current basic assumptions that underlie generative theory. Code-switching in general, and code-mixing in particular, are vastly interesting precisely because they constitute the strongest type of evidence for I-language and its relationship to E-language (i.e., competence vs performance). In other words, code-mixed speech supports, on the one hand, the long held view that language is creative/innovative; and on the other, it contradicts the claim that competence and performance are separate and distinct aspects of language knowledge (Chomsky 1965, 1972, 1975, 1986). Assuming that code-mixed speech represents the externalization of the internalized bilingual's knowledge of the languages concerned, can linguistic, especially syntactic theory account for this intuition? If so, how can this be done and what implications would the extension of the syntactic theory in this respect have for general theory? We take up these questions in the next and last part of this paper.

2.2 Overview of linguistic theory. To understand the significance of code-mixing to linguistic theory, it is necessary to review the objectives of Transformational Grammar (TG) and its basic assumptions and principles.

We stated at the beginning of this paper that the main objective of generative theory has been to discover the universal properties that underlie human language and to provide a character-

ization of what it is that a person knows when (s)he knows a language, and how such knowledge is acquired (Chomsky 1965, 1972, 1975, 1981). Initially the theory focused on questions (1a-c), but in the last two three years or so the scope of inquiry has come to include the issue of language use, viz., question (1d).

In the Aspects of the Theory of Syntax (1965) model (Standard Theory, ST) and its extended versions (Extended Standard Theory, EST) of the 1970s, the theory attempted to answer the questions in (1) by assuming the construction of sentences to be based on the interaction of three major components: syntactic, phonological, and semantic, with the last two being largely interpretational and the first basic. Two levels of linguistic representation, viz., deep and surface structure, were postulated; and a series of transformational rules (both in syntax and phonology) was posited to operate on specific base-rules (in the deep structure) to construct the phonetic/surface structure (Chomsky 1965, 1975). Thus in the construction of a language-specific monolingual sentence such as the KiSwahili (8)

- 8) Tafadhali ni-elez-e ma-nene haya
(Please explain these things/matters to me.)

the relevant syntactic, lexical, and phonological representations upon which the transformational rules and rules of semantic interpretation would operate would be extracted from the grammar of KiSwahili. Such a grammar, it was assumed in the ST, was free of errors and diversity: it was the grammar of the idealized speaker who lived in a homogeneous speech community. This model underwent a number of changes in the 1970s to become the Extended Standard Theory (EST) (Radford 1981).

With the advent of Government and Binding theory (GB) in 1980/1981, the over-all conception of linguistic theory has changed radically: we have moved from a theory of rules to a theory of principles (Riemsdijk & Williams 1986). Specifically, the transformations assumed under the previous model, TG, are now handled by a small set of principles based on the principles of the "core grammar" (i.e., universal grammar). Only one transformation, viz. "Move-Alpha", has been retained under the new theory. The role of this transformation is not to relate D-structure to S-structure, but rather to move any element anywhere in a sentence in accordance with the sub-theories of GB: binding, 0-criterion, control, etc. (Chomsky 1982, 1986).

Unlike the TG of the 1960s and 1970s which paid lip-service to UG and child language acquisition, GB theory actively attempts to address itself to these questions in the hope of providing a general characterization of the language faculty. The range of

languages drawn upon to develop the various principles in the theory has expanded from English, to other languages of the world, including Bantu languages (Bergvall 1982, 1983, Clements 1984, Zaenan 1984). Child language acquisition, which Chomsky continues to regard as the ultimate test of the explanatory adequacy of any linguistic theory (Chomsky 1982, 1986), receives considerable attention in GB theory.

In spite of the claim by Chomsky (1986: 3ff) and some of his followers, e.g., Riemsdijk and Williams (1986), that performance/language use is one of the key issues to which current linguistic theory seeks answers, very little attention has been paid to it in the syntactic literature. In fact, Chomsky continues to treat performance, referred to now as "Externalized language", as derivative. He states (Chomsky 1986: 31):

- (9) The account presented by Quine [1972], Lewis [1975] and others has the story backwards: E-languages are not given, but are derivative, more remote from data and from mechanisms than I[internalized]-languages and the grammars that are theories of I-languages; the choice of E-language therefore raises a host of new and additional problems beyond those connected with grammar and I-language.

By maintaining the primacy of I-language over E-language, current syntactic theory rejects the legitimacy of E-languages as objects of linguistic inquiry. We concur with Bresnan and Kaplan (1982:xix) that "if it is uncontroversial that stored knowledge structures underlie all forms of verbal behavior, the question arises here of how these different components of linguistic knowledge are related." Is the appeal to "idealization" of language simply an attempt "to restrict the kind of evidence that may be brought to bear on representational issues," as Bresnan and Kaplan (1982:xxiii) observe, or is it a way to gain some initial insights about the language faculty? What role, for example, should an I-language/grammar play in models of performance?

In attempting to answer these questions, among others, a number of linguists have suggested recently that linguistic theory should reflect socio-psychological reality (cf. Labov 1972, Ervin-Tripp 1970, Hudson 1980, Bresnan & Kaplan 1982). Bresnan and Kaplan (1982: xxii) observe in this regard that

- (10) [The concept of competence] requires that we take responsibility not only for characterizing the abstract structure of the linguistic knowledge domain, but also for explaining how the formal properties of our proposed linguistic representations are related to the nature

of the cognitive processes that derive and interpret them in actual language use and acquisition. Chomsky's current conception of psychological reality represents a retreat from this more ambitious, and scientifically far more interesting, goal.

Bresnan and Kaplan (1982: xxiii) note further that,

- (11) Since we cannot directly observe this 'internal grammar,' we must infer its properties indirectly from the evidence available to us (such as linguistic judgments, performance of verbal tasks in controlled experimental conditions, observations of the linguistic development of children, and the like). The data of linguistics are no more or less privileged for this inquiry than any other data.

In pursuit of these research objectives, Kaplan and Bresnan (1982) developed the theory of Lexical-Functional Grammar (LFG) in which it is assumed that there are only two major structural components (i.e., constituent structure and functional structure), and no transformational rules of any kind. All grammatical relation-changing rules are assumed to be lexical operations, and the distinction between D-structure and S-structure is dispensed with completely (Kaplan & Bresnan 1982, Kaplan, Maxwell & Zaenan 1987). The mapping between the c-structure and the f-structure is achieved in a "many-to-many", rather than isomorphic fashion.

The elimination of abstract syntactic concepts such as deep structure, surface structure, and transformational rules in LFG is seen by Bresnan (1978, 1982), and Kaplan and Bresnan (1982), among others (e.g., Mchombo 1978), as a necessary refinement that will eventually lead both to a simpler and more realistic theory of language than competing theories have hitherto permitted. In this paper we will argue that the investigation of CM can play a significant role in refining further our conceptualization of syntactic theory.

It is important to point out here that while the architecture of GB and LFG differ in many significant respects, they do share one major common assumption: the lexicon and related lexical rules are language-specific. This view raises a number of fundamental questions regarding the analysis of code-mixed sentences, as we will see in the following section.

2.3 Code-mixing and linguistic theory. There have been essentially two main approaches in the study of the general phenomenon of CS: functional and descriptive/syntactic. The functional approach has attempted to identify the various socio-psychological functions that CS serves and the contexts in

which the phenomenon occurs. (cf. Gumperz 1970, Gumperz & Hernandez 1972, Scotton & Ury 1977, Jacobson 1978a,b, Kachru 1978). The descriptive/syntactic approach has attempted to provide a general characterization of the structural properties exhibited in CS in general, and CM in particular, under the ST and the EST models (Wentz 1977, Lipski 1978, Pfaff 1979, Poplack 1980, Sridhar & Sridhar 1980, Joshi 1985).

The dominant paradigm in the syntactic approach has been to analyze CM speech in terms of syntactic constraints on what can or cannot be mixed. The implicit goal of the hypothesis underlying this approach is that in order for a code-mixed utterance to be grammatical, there must be surface syntactic equivalence/congruence at the juncture where the mixing occurs between L1 and L2 (Lipski 1978, Poplack 1979). In view of this hypothesis, several constraints have been proposed in the literature to purportedly account for the grammaticality of various code-mixed utterances in different languages. The most popular of these restrictions include the Adjectival phrase Constraint, the Equivalence Constraint, the Free Morpheme Constraint, and the Dual Structure Principle stated in (12) through (15):

(12) The Adjectival Phrase Constraint (Pfaff 1979):

Adjective/noun mixes must match the surface word order of both the language of the adjective and the language of the head noun.

(13) The Equivalence Constraint (Poplack 1980: 586):

Code-switches will tend to occur at points in the discourse where juxtaposition of L1 and L2 elements does not violate a syntactic rule of either language, i.e., at points around which the surface structures of the two languages map on to each other.

(14) The Free Morpheme Constraint (Poplack 1980: 585-6):

Codes may be switched after any constituent in discourse provided that [that] constituent is not a bound morpheme.

(15) The Dual Structure Principle (Sridhar & Sridhar 1980):

The internal structure of the guest constituent need not conform to the constituent structure rules of the host language, so long as its placement in the host sentence obeys the rules of the host language.

The unstated objective of the constraint-oriented approach to CM is to provide a definition of the notion "possible grammatical utterance/sentence" in CM. Such a definition, it is assumed, would enable us to make certain syntactic predictions and draw psycholinguistic inferences about the grammar of the bilingual code-mixer.

Unfortunately, however, all the syntactic constraints proposed in the published literature thus far, including those stated in (12) through (15), have been invalidated by data from various language groups (cf. Nartey 1982, Bokamba 1985, El-Noory 1985, Pandharipande 1986, Kamwangamalu 1987a). As a consequence of the invalidity of these constraints, the most fundamental question, viz. the characterization of the bilingual's grammar, which research on CS seeks to address, has remained unanswered.

As we suggested previously, the lack of meaningful progress in this respect is due in part to flawed assumptions about CS/CM based on Spanish-English dominated data and a restricted data-based theory. Mere description of which elements of the sentence can be switched and at what juncture do not address the issue of the internalized bilingual grammar. The discussion of this question requires us to deal with the following key sub-questions, among others: (1) How many grammars has the bilingual code-mixer internalized? (1) If (s)he has internalized one super-grammar, how does it work in the production of monolingual and code-mixed speech? (3) If (s)he possesses two or more grammars, how do they interact in the production and recognition of code-mixed speech? For instance, are the grammars accessed simultaneously or sequentially in such speech processing? And (4) how can the knowledge that underlies the code-mixed verbal behavior be described syntactically under any of the current syntactic theories?

These questions constitute a research program and cannot be answered in a study of this scope. What we would like to do in the remainder of this section, however, is to examine a few facts from code-mixed speech involving Bantu and European languages in order to ascertain their syntactic characteristics. With this analysis we can then draw certain inferences concerning the nature and organization of the bilingual's grammatical systems.

Consider in this regard, the Nairobi Swahili code-mixed sentences in (2) and (7) and the Kinshasa Lingala sentences in (3) and (6), repeated here for convenience.

KiSwahili-English:

- (2) a. Ni-na-m-provoke kila wakati tu-ki-kutana naye (Scotton 1983)
 I-Pres-OM-provoke each time we-TA-meet with-him
 (I provoke her every time if we meet with her.)

b. Ni nani a-li-i-spoil kamba yetu? Iko short sana..(Scotton, id.)
 Is who 3rdSg-pst-OM-spoil rope ours it's short very
 (Who spoiled our rope? It is very short...)

- (7) Ile accident ilitokea a-li-po-lose control na a-ka-
 overturn and landed in a ditch (Abdulaziz 1972.)
 (The accident occurred when he lost control and overturned..)

Lingala-French:

- (3) a. Soko a-compren-aki yo te a-kok-aki ko-ndima te.
 If he-understand-Impf you not, he-can-Impf to-agree not
 (If he did not understand you, he would not have agreed)
- b. Ba-garcons wana ba-zo-mi-défendre pamba.
 Pl-boys there they-be-OM-defend just for-nothing
 (Those boys are arguing (in self-defense) just to save
 face.)
- (6) Boni, Beya, osili kozonga! Tu rentres comme-ça sans me
 prevenir? (Bokamba 1985)
 (Well, Beya, you are already back! You return (just like
 that) without warning me?)

Sentence (2a) contains the English verb stem -provoke to which are prefixed a number of KiSwahili morphemes: ni for first person subject marker; {-na-} for present (continuative) tense prefix; and {-m-} for third person object marker.

Assuming that the lexicon and lexical rules are language-specific, as noted earlier, what we can infer from the construction of sentences such as (2a) is this. The speaker determines, first, the appropriate syntactic structure in Swahili; (s)he then makes the relevant lexical insertions by drawing the verb provoke from English and the rest of the lexicon from KiSwahili, before applying the requisite morpho-syntactic, phonological and semantic interpretation rules from KiSwahili. Since provoke is pronounced as in an English monolingual sentence, it presumably undergoes English phonology. Unless one assumes that the verb provoke is a loanword, which it cannot be because other words are treated similarly, sentence (2a) cannot be construed as being derived from a monolingual grammar. The same analysis applies to (2b), with the addition that the O(bject) M(arker) {-i-} here refers to the noun kamba 'rope'. Further, in the second sentence of that discourse, the adjective short is drawn from the English lexicon. In both sentences (2a,b) the grammatical rules that apply are characteristically KiSwahili, and therefore Bantu: English here only provides a few lexical elements.

Sentence (7), which consists of two conjuncts joined by the conjunction *na*, provides one of the best illustrations of the interaction of the two grammatical systems: KiSwahili and English. The sentence contains three KiSwahili lexical elements (disregarding for a moment the affixes): the demonstrative *ile* 'that' (functioning here as a definite article), the verb *ku-tokea* 'to occur/happen,' and the conjunction *na* 'and/with.' Except for the occurrence of the KiSwahili prefixes on the verb, viz. (a-) for third person (human class) singular subject prefix, (li-) for past tense marker, (-po-) for relative temporal marker, and (-ka-) for consecutive tense marker, the rest of the sentence is English. Morphosyntactically, sentence (7) exemplifies the intricate mixing of the grammatical rules of the language-pair: the construction of the sentence appears to draw equally on the syntactic, lexical (i.e., lexicon and lexical-formation rules), phonological and semantic components of English and KiSwahili.

Consider, next, the Kinshasa Lingala sentences in (3) and (6). The sentences in (3) illustrate a similar interaction to (7) between the rules of Lingala and French. Sentence (3a) includes in its first clause the French verb *comprendre* to which is prefixed the third person human subject marker (a-), and suffixed the imperfect tense marker (-aki); the rest of the elements in this sentence are Lingala. Sentence (3b) is thus far the most interesting structure for two main reasons: First, it exhibits a doubly pluralized subject noun, *ba-garcon-s* 'boys', where the human class 2 prefix (ba-) cooccurs with the French plural suffix (-s). Second, it contains a concatenation of the Lingala auxiliary verb *ko-zal-a* 'to be' and the French verb *defendre*. Sandwiched between these two verbs is the Lingala reflexive pronoun (-mi-). The construction of this sentence involves not only the rules referred to in the description of the sentences in (2) and (7) above, but also pluralization and reflexivization. Pluralization appears to have applied twice: once in French and then in Lingala.

The discourse in (6) includes two sentences, one in Lingala and the other in French. The first sentence in this discourse, which consists entirely of Lingala lexical elements, would presumably be processed in the usual fashion by applying the rule of subject-verb-agreement (SVA) to the base in a GB framework. This application will produce the third person human subject prefix (a-) on the verb *ko-sil-a*. In an LFG framework SVA, as a lexical rule, would result naturally from the association expressed between the subject and the verb in the structural tree (Bresnan & Mchombo 1987). Similarly, the French sentence in the discourse would be processed in the same fashion by the application of SVA to produce the second person agreement marker (-s) on the verb *rentrer*. It is to be noted here that unlike

in the construction of (2), (3) and (7), the processing of each of the sentences in (6) does not involve the interaction of the grammatical rules of the language-pair at any level: each grammar operates independently. This type of relation is characteristic of code-switched, rather than code-mixed, speech.

In summary, the few facts we have examined here yield the following generalizations. Code-switched sentences are produced from a monolingual grammar, while code-mixed sentences are produced minimally from a bilingual grammar of some sort. In the latter case, the grammatical rules of the language-pair concerned can interact at different levels ranging generally from the mere sharing of lexicons to complex morphosyntactic operations (e.g., SVA, reflexivization, object incorporation, etc.). In each code-mixed sentence the speaker seems to treat morphosyntactically all elements as if they belonged to the same language; but phonetically and phonologically each lexical item retains the properties of the language of origin. It is evident from the facts presented here that code-mixed speech is much more integrative of the grammatical systems of the languages involved in the discourse than it has been hitherto generally acknowledged in the literature.

These conclusions or similar ones have been noted previously in the literature on code-switching (cf. Lipski 1978, Poplack 1979, Kachru 1982, Bokamba 1985, Kamwangamalu 1987). Cross-linguistic facts similar to those cited in (2), (3), (6), and (7) exist in and can be cited from many other language-pairs throughout the world (Bokamba 1987 & forthcoming, Kamwangamalu, forthcoming, but they will not materially alter these conclusions. What is particularly interesting to us are the implications of these facts for the development of what Kaplan and Bresnan (1982) call "a realistic linguistic theory". We now turn to a consideration of this question.

3.0 SIGNIFICANCE OF CODE-MIXING TO LINGUISTIC THEORY.

The facts presented in (2), (3), (6) and (7) raise very interesting questions concerning both the syntactic construction of sentences in code-mixed speech and the mental representation of the bilingual's grammar. If "Externalized language" (E-language) is an indirect reflection of "Internalized language" (I-language), as Chomsky (1986) suggests, then the occurrence of code-mixed speech as a world-wide phenomenon necessitates a re-examination of current grammatical theory. In this section we take up this question and propose an analysis that has important consequences for linguistic theory in general.

3.1 Inferences about the bilingual's grammar. Code-mixed speech in Western and non-Western language pairs has been assumed

to represent the highest degree of bilingual and multilingual competence (cf. Poplack 1982, Kachru 1982). This assumption is based on at least two main facts: (1) the rapidity and effortlessness with which code-mixed speech is produced by bi- and multi-lingual speakers; and (2) the morphological and syntactic integration exhibited in such speech, as seen in the illustrations given in the preceding sections. These facts indicate, as is now universally recognized in sociolinguistics, that code-mixed speech is rule-governed. The question that arises here is how to formally characterize such speech.

In one of the current approaches to syntax, viz. GB, it is assumed that the construction of sentences crucially involves the interaction of categorial and transformational rules (all lumped under "move alpha") mediated by phonological and semantic rules of interpretation (Chomsky 1986, Riemsdijk & Williams 1986). The construction, in proceeding from the postulated D-structure to the S-structure, is assumed to be based on a single dialect of a single language. Thus the various categorial, phonological, morphological, syntactic and semantic rules of interpretation are drawn from one and the same grammar, variations even from the same language are excluded from consideration. Code-mixed data pose a problem for this framework, because (a) they come from at least two dialects or languages, and (b) they show intricate interaction between the rules of the language-pair involved in the discourse. Given the commonly accepted hypothesis that speech or E-language is an indirect reflection of I-language, syntactic theory must therefore be able to accommodate code-mixed data. Currently this does not appear to be possible within the GB theory.

To characterize code-mixed data it is necessary to first understand the internal relationship that obtains between the grammars of the bi- and/or multi-lingual speaker. Such an understanding can be gained in the usual way through inferences based on an examination of data produced by the speaker, for example the sentences cited in (2), (3), and (7) above. From a morpho-syntactic perspective the salient characteristics identified and described in section (2.3) demonstrate an amazing degree of grammatical integration between the rules of any language-pair. It is not merely the insertion of lexical items from one language into another, but also how these lexicons are treated by the word-formation and syntactic components of the host language. It appears to us that psycholinguistically in order for the bi- and/or multi-lingual speaker to be able to produce an understand effortlessly such utterances, two necessary conditions must obtain: (1) (s)he must have internalized the grammars of the languages concerned, and (2) (s)he must be able to access these languages simultaneously at the moment of speaking. Intuitively,

it seems that the lack of one of these capabilities would seriously hamper code-mixed speech production and interpretation. The question then is, how can this bi-/multi-lingual competence be conceptualized?

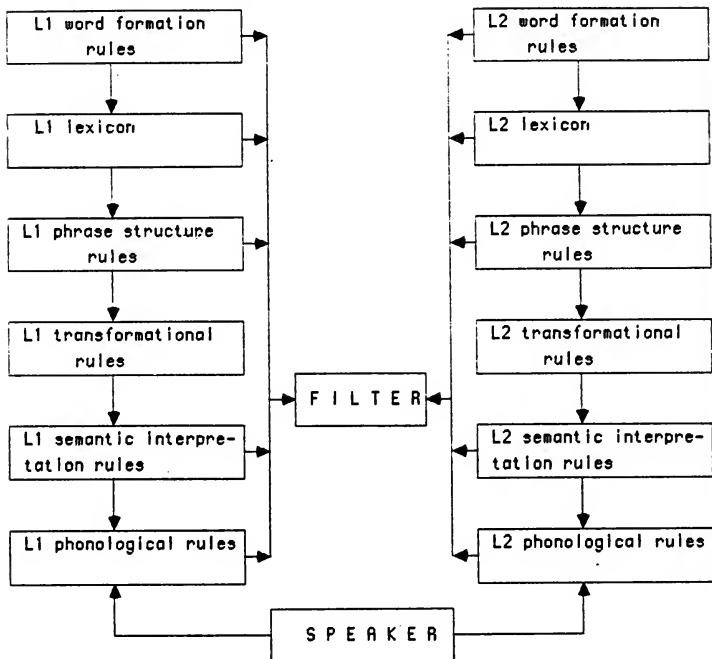
Following Bakamba (1985), we will assume here that the bi-/multi-lingual (code-mixing) speaker has internalized at least two grammatical systems. These systems operate independently of each other in the production and interpretation of monolingual speech, but interact in very specific ways in the production and interpretation of code-mixed speech. More specifically, in the production of monolingual speech, the speaker extracts the relevant syntactic, lexical formation, phonological, and semantic interpretation rules from that particular language. These rules may be selected from one of the several dialects that the speaker has internalized, unless (s)he is producing mixed dialect speech. In the production of code-mixed speech, in contrast, the grammars of the two languages involved in the discourse interact by providing selected elements and rules for the derivation. The selections from each grammar are determined by the host language in the sentence under construction. For instance, if Lingala is the host language and French the guest language, as in the examples given in (3), some lexical elements and possibly some categorial rules will be extracted from the latter; but the vast majority of these will come from the former.

3.2 Internal organization & processing mechanism. The interaction of the bilingual's grammars described thus far raises questions regarding (1) the internal organization of these grammars, (2) their inter-relationship, and (3) the processing mechanism(s) invoked in the construction of code-mixed utterances. While there have been some attempts in the published literature to address the question of processing mechanism in code-mixing or code-switching, no published work known to us has dealt with the issues of internal organization and inter-relationship of the bilingual's grammars (Bautista 1975, Sridhar & Sridhar 1980, Joshi 1983, Ewing 1984). In this section we take up all three questions, drawing heavily on Bokamba (1985).

Bokamba (1985) views the bilingual's grammar as consisting minimally of two independent grammars that may be connected at the appropriate speech event time through a filtering or speech editing mechanism, as illustrated in (16)³.

Psycholinguistically, the filter or editor postulated in (16) can be viewed both as a monitor and trigger device for speech

(16) The bilingual grammar of a code-mixer (Bokamba 1985)



processing. It serves as a monitor and editor in the production of code-mixed speech by ensuring the relative grammaticality of the utterances being processed by the speaker. Aspects of sentence production such as word order, lexical selection, and application of phonological and morphosyntactic rules in code-mixed speech is monitored closely by the filter. In our example

sentences, for instance, the filter will make sure that English and/or French verbs inserted in the sentence would receive the appropriate Bantu verb morphology. The filter functions as a trigger mechanism by being sensitive to the context or sociolinguistic situation of the discourse. For instance, the presence of a bi- or multi-lingual listener in the discourse may trigger code-mixing, while that of a monolingual would inhibit code-mixing. Similarly, code-mixing on the part of a listener will very likely elicit a code-mixed response from another listener. When the appropriate conditions are met, the filter will make the internalized grammars accessible to the speaker.

If we assume the kind of internal organization just described and illustrated in (16), it becomes possible to conceptualize a syntactic theory that would allow the construction of sentences from several grammatical sub-systems or systems. Under this conception of the interconnection of grammars it is plausible for the speaker to draw rules and lexicons freely from any one of his/her languages or dialects in speech production. Whether the model proposed in (16) is accurate or not, is beyond the scope of the present study and will likely not be ascertain for a long time. What we are hypothesizing here is that there is a psycholinguistic, and probably a neurolinguistic, interconnection between the (sub-)grammars internalized by bi- and multi-lingual speakers so as to permit them to produce code-mixed speech in the manner they do.

If we accept this characterization of the internal organization of the bilingual's grammar and assume a theory that allows T-rules, for example GB, the construction or processing of monolingual sentences would proceed in the usual fashion. The construction of code-mixed sentences, however, can be viewed as occurring in seven ordered psycholinguistic steps: (1) determination of the D-structure in the host language; (2) selection and insertion of the relevant lexical elements from L1 and L2; (3) application of the host language lexical phonology and morphology rules; (4) application of the guest language phonological rules; (5) scanning of the structure to determine syntactic compatibility between the host and guest languages; (6) application of the relevant local adjustment syntactic rules of L1 and L2, and (7) application of the relevant host or guest language T-rules to the relevant clause (Bokamba 1985: 34). Steps (1) through (4) and step (7) are general in the sense that they are applicable also in the construction of monolingual sentences. Steps (5) and (6) are more particular to code-mixing than they are to monolingual speech, and constitute what we have referred to as the filtering or speech editing mechanism.

It is assumed under this conception of the bilingual's

grammar that code-mixed sentences typically involve two languages at a time. In the construction of the (code-mixed) sentence, the speaker accesses simultaneously the grammar-pair to be drawn upon. The lexicon for the sentence is drawn freely but selectively from what Bokamba (1985) regards as a composite thesaurus consisting of L1 and L2 lexical elements. The structure then undergoes filtering/editing, i.e., steps 5 and 6, before being subjected to the application of the relevant morphosyntactic rules in the host language or guest language; depending on the clause concerned. Step 6 performs word order adjustments, whenever and wherever necessary, to permit the production of an acceptable surface code-mixed sentence. The re-ordering may conform to the host or guest language constituent structure depending on the constituent in question. As will be noticed from the Figure in (16), the T-component is not subject to filtering, because there is no evidence that transformations interact in the construction of clauses (Bokamba, 1987). That is, transformational (à la GB) or lexical rules (à la LFG) appear to be language-specific.

3.3 Conclusions. The main concern of this study was to argue for the significance of code-mixed data in the formulation of syntactic theory. Our claim was that code-mixed speech is a concrete externalization of part of the internalized knowledge of language (i.e., I-language) that a bi- and multi-lingual speaker has. In the course of the discussion we examined a few sample sentences involving code-mixing and code-switching, and described their salient morpho-syntactic characteristics. The facts adduced have shown clearly that code-mixed sentences exhibit extensive integration of several of the linguistic components (i.e., lexical, word-formation, syntactic) of the language-pair involved in the discourse. We have argued that code-mixed data cannot be accounted for under a model such as GB, and possibly LFG (although we have not pursued the argumentation in this respect fully)⁵ for two main reasons: (1) mono-lingual and mono-dialectal data are assumed to be only appropriate objects of syntactic investigation in these theories; and (2) there is no provision, as a result of the first assumption, for a bilingual dictionary in the construction of sentences. To obviate these difficulties, we have suggested that the linguistic competence of bi- and multi-lingual speakers be viewed as involving a network of (sub-)grammars which interact under the appropriate conditions to allow the production of various sorts of speech: monolingual, code-mixed and code-switched.

3.4 Theoretical implications. One of the most commonly held views about human language is that language is very creative (Chomsky 1965, 1972, 1981, 1986). This creativity is reflected in the production and interpretation of novel

sentences, child language acquisition, and second language learning. A second popular view held in generative grammar is that language knowledge is mentalistic and that there is a special innate language faculty which caters to this knowledge (Lenneberg 1967, Chomsky 1972, 1975, 1986, Riemsdijk & Williams 1986). In light of these views, the study of language in the last 30 years has predominantly focused attention on what Chomsky (1986) terms "internalized language". As noted earlier in this paper, however, the "I-language" that serves as the basis for the formulation of linguistic theory is drawn from intuitive judgments of monolingual and mono-dialectal speakers (cf. Chomsky 1986). Except for the work of sociolinguists, especially variationists (cf. Labov 1972, Gumperz 1982, Trudgill 1983, Mufwene 1986), multi-dialectal and multi-lingual data have rarely been used as a basis for theoretical formulation. If the main objective of linguistic theory is to provide a characterization of I-language, "how it is constituted, how it is acquired," and "how it is used" (Riemsdijk & Williams 1986: 3), then there is no better indicator of this knowledge than multi-dialectal and multi-lingual data, because they exemplify one of the most creative aspects of language knowledge by integrating lexicons and grammatical rules from different languages in the construction of sentences. To process sentences from one language requires one type of skill or level of knowledge; but to process sentences from two or more languages simultaneously requires special knowledge because of the complexity involved. This special knowledge, call it ability 2, can be understood by extending the domain of linguistic investigation to code-mixed and other multi-lingual data. It seems to us that the acceptance of these facts as legitimate objects of linguistic inquiry will not only lead to better insights in answering questions (1a-d), but will also force the theory to incorporate the types of conventions and assumptions suggested above.

NOTES

*This is a revision of a paper presented at the 17th Annual Conference on African Linguistics held at Indiana University, Bloomington, April 1987. We acknowledge with gratitude the comments of two of SLS reviewers, Yamuna Kachru and Michael Kenstowicz, on the pre-final version of this paper. We alone are responsible for any error of analysis or interpretation.

¹See also Sridhar & Sridhar 1980 for similar definitions.

²For detailed criticism of this literature see Bokamba (1985, 1987), and for a general review of the published literature to date see Kamwangamalu (1985, and forthcoming)

³This is a very tentative representation that is undergoing revision to reflect currently shared tenets of GB and LFG theories (cf. Bokamba, forthcoming).

⁴There is considerable evidence in the code-switching literature which suggests that code-mixing speakers treat lexical items from their languages of competence as if they were synonym from the same language.

⁵For a detailed discussion of the descriptive and theoretical problems posed by code-mixing vis-a-vis GB and LFG, see Bokamba (forthcoming).

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A COMPUTER TOOL IN THE STUDY OF TAIWANESE TONES¹

Tsai-Chwun Du

This paper introduces a method which incorporates a pattern matching algorithm and computer techniques in the investigation of the inventory of Taiwanese tones. The result turns out to be fairly satisfactory. From the clustering results we postulate the underlying forms of the short citation tone in the dialect examined.

0. INTRODUCTION

With the development of digital computer techniques, people doing acoustic analysis such as Tseng (1981) have been able to use computers to analyze speech sounds, abstracting suprasegmental features like stress, intonation, and tone. Most researchers, in studying the tonal phenomena, derive the tonal inventory of a tone language through perception or sonagraph machine. Perception is, of course, more subjective than objective. I do not claim that it is incorrect to count on perception in the study of tones, particularly since prior to the development of computer technique or sonagraph machine, it was the only method available. However, it is not easy for tone-deaf people to perceive contrastive tones. Sonagraph machines have already been available for waveform and frequency display. However, in the calculation of the fundamental frequency, it is not very convenient, e.g. the F0 is usually obtained by dividing the 10th harmonic frequency by 10. With the help of the computer hardware and software, the F0 can be calculated automatically by computer program. In this paper, I will introduce a tool that can be used to derive the tonal inventory of a language without depending on measuring frequencies through a sonagraph machine. This tool is not to replace the perception role in the investigation of tones as most linguists have been very successful in discovering the tonal inventories of different languages by their perception only. It is rather designed to show that computer techniques can be related to the study of language phenomena in the area of computational linguistics.

The tone language I used for the experiment is Taiwanese, a Chinese language, which is spoken in Taiwan.² Basically, each syllable in Taiwanese has two tones: the citation form which occurs in isolation or before a neutral tone and the sandhi form which occurs in other environments³. Except for the Qingshui dialect mentioned briefly by Ho (1984) which has six citation tones, all studies in Taiwanese tones (R. Cheng 1973, 1977, Tung et al 1967, Zhang 1983) report that there are seven citation tones. Of the seven tones, five are non-entering (long) tones and two are entering (short) tones. The long tones are with open syllables or syllables ending in nasal consonants, e.g. /si55/ 'silk', /si33/ 'yes', /si53/ 'die', /si21/ 'four', /si13/ 'time' in R. Cheng (1977). The short tones are with syllables ending in stops /p, t, k, ʔ/, e.g. /sit53/ 'honest', /sit21/ 'lose' in R. Cheng (1977). In the Qingshui dialect, there are five long tones and only one short tone. I am a native speaker of Taiwanese. In this paper, I confirm Ho's findings that the Taiwanese spoken in some areas in Taiwan, like Qingshui dialect, does have five long citation tones and only one short citation tone. In order to find out whether there are actually six citation tones, I used a computer and a pattern-matching algorithm to derive the inventory of the citation tones and the sandhi tones. In the examination of the sandhi

tones, we discover that there are two short tones underlyingly. These two short tones are neutralized in isolation, but the distinction remains before a special tone category, the neutral tone, which will be discussed in the text later. In the following sections, I will first describe the motivation for the experiment. Then I discuss the tool used in the analysis of the tones: the computer hardware and software used to extract the fundamental frequency of each syllable and the statistical algorithm used to classify the tones. Finally, I will present the statistical results from which the tone inventory is derived.

1. MOTIVATION

The idea of using computers and pattern matching algorithm to study tones came from research in Mandarin tones done by Cheng and Sherwood (1981) who extracted six parameters from each syllable input through a pitch extraction device interfaced with PLATO. These six parameters are the beginning frequency (BF), the mid frequency (MF), the end frequency (EF), the beginning-end slope (BESL), the beginning-mid slope (BMSL), and the mid-end slope (MESL). The six parameters are used for tone recognition. The recognition result shows that some parameters or combination of parameters are better than others in identifying tones. With the assumption that some parameters are better cues in tone recognition and can be used to group syllables produced with one tone together within a person's pitch range, I adopted these six parameters for the use of tone classification. Furthermore, I added a seventh parameter, tone duration (DUR) because tone length between the long and short tones is distinctive in Taiwanese. The classification of the citation tones is based on a pattern matching process called the K-means algorithm (Macqueen 1965). This process groups syllables that have similar parameter values together. The average parameter values of each group represent one tone value. To obtain the values of the seven parameters, I used a speech program to get the fundamental frequency of each syllable. The seven parameter values were calculated and stored on a file for the subsequent grouping process.

2. COMPUTER TOOLS

2.1 THE SPEECH PROGRAM

In examining the tones, I used a digital computer technique to calculate the fundamental frequency of the speech input. In this section, I will briefly discuss the structure of this speech program.

The computer program used for the speech processing of voice in the pitch extraction experiment requires an electronic analog-digital (A/D) and digital-analog (D/A) converter.⁵ The program was written in BASIC and was designed to

- (a) accept speech input, display the waveform, and echo the sound back to the user;
- (b) splice the speech input in order to extract monosyllabic words;
- (c) calculate and plot the fundamental frequency of the speech input.

With this A/D and D/A converter, the program sampled at the rate of 10 K/sec for male voices and 20 K/sec for female voices.⁶ Using this program, sounds could be input through a tape recorder, the waveform displayed on the computer screen, and the sound reproduced. The sound was 1.2 seconds long for male voices and 0.62 seconds long for female voices.

2.2 EXTRACTION OF THE FUNDAMENTAL FREQUENCIES

The fundamental frequency estimation (also called pitch period estimation) was carried out by using the autocorrelation function (Rabiner and Schafer 1978:141-148), the center clipping function (Sondhi 1968), and the three-level center clipping function (Dubnowski, Schafer, and Rabiner 1976).⁷ With these functions, the software was written to calculate the F0 of a monosyllabic input sound and print the frequency on the computer screen. Figure 1 shows the waveform and fundamental frequency of syllable /si:55/ 'silk' with high level tone computed by the speech program.

The seven parameters were obtained in the following way. The program was also written to search for the meaningful beginning and end fundamental frequency points of a syllable. In the process of searching for the meaningful beginning point, the difference in the fundamental frequency between two neighboring points is checked until a difference in frequency not greater than 10 Hz is found. Then the leftmost of these two points was selected as the beginning point. Next the program searched for the meaningful end point from the end of the syllable. The search continued backwards (leftwards) until a difference in frequency not greater than 10 Hz was found. Then the right point was chosen as the end point. Once the beginning and end points were located, the time of each point was calculated. The tone length was obtained by subtracting the time of the beginning point frequency from the time of the end point frequency. The mid point time and frequency were determined as well. The parameter 'duration' in our experiment refers to tone duration rather than syllable duration. To get the beginning-end slope, the beginning-mid slope, and the mid-end slope, Cheng and Sherwood's formulae (1981) were followed:⁸

$$\text{beginning-end slope} = \frac{(\text{end frequency} - \text{beginning frequency})}{\text{time}}$$

$$\text{beginning-mid slope} = \frac{(\text{mid frequency} - \text{beginning frequency})}{\text{time}}$$

$$\text{mid-end slope} = \frac{(\text{end frequency} - \text{mid frequency})}{(\text{end time} - \text{mid time})}$$

The seven parameters of each syllable were stored on a file for the purpose of similarity grouping discussed next.

2.3 K-MEANS ALGORITHM

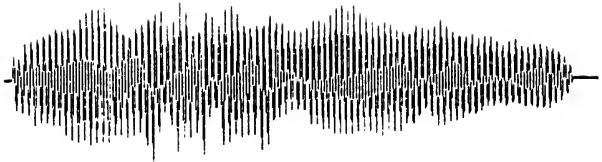
The K-means algorithm is a process of partitioning large groups of samples into K sets on the basis of specified values. MacQueen (1965:283) gives a good definition of the K-means process. He says,

Let Z_1, Z_2, \dots be a random sequence of points (vectors) . . .

The K-means procedure consists of simply starting with K groups, each of which consists of a single random point, and thereafter adding each new point to the group whose mean the new point is nearest. After a point is added to a group, the mean of that group is adjusted in order to take account of the new point. Thus at each stage the K-means are, in fact, the means of the groups they represent.

Basically what the K-means algorithm does is to cluster a body of samples into K number of groups, each of which consists of samples of similar X. X can be anything, e.g. social values, distance, etc. The steps for clustering N samples are the following:

waveform



BF = 260 MF = 250 EF = 253

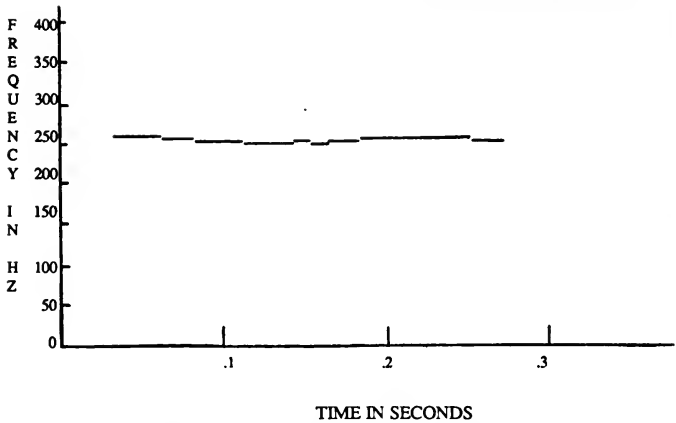


Figure 1. The waveform and fundamental frequency of the word /si/ 'silk' transcribed with 55 in citation form

- (a) select the number of groups, i.e. K;
- (b) select (randomly) a sample as the initial center of each group; whatever value the initially selected sample has is considered initial mean value of the group;
- (c) compute the difference between the value of any new sample and that of each group center. then add this new sample to the group to whose mean the new sample is nearest;
- (d) recalculate the mean and go back to step c until all the samples are properly classified.

So with a set of raw data at hand, one has to specify the number of groups and the center values so that the algorithm is able to properly classify the data into different groups. There are several applications of the K-means process; one of them is 'similarity grouping' (MacQueen, 1965:288). In my experiment, this K-means process is used to do similarity grouping, i.e. classify all the speech data into seven tonal groups based on the distances among the parameters.

3. EXPERIMENTS

As mentioned, previous studies in Taiwanese tones (R. Cheng 1977, Tung et al 1967, Zhang 1983) show that there are seven citation tones. Thus in the very beginning I will also assume that there are seven citation tones in the data to be examined. The selection of groups is very important that the more groups are selected, the more detailed the tone classification is. Without this initial assumption the clustering program cannot perform any job. As at most seven citation tones have been reported in Taiwanese dialect, so I choose seven. For a language with no literature reference, it is advisable to divide the raw data into groups ranging from 2 to 9. From the classification print out, a linguist will be able to find how many possible tonal alternations there are in the language examined. Section 3.1 deals with citation tones and sections 3.2 and 3.3 deal with sandhi tones.

3.1 CITATION TONES

3.1.1 DATA

The speech data were citation forms, consisting of 140 monosyllabic words selected from R. Cheng (1977) and Zhang (1983), 20 words for each tone. In order to differentiate these words, each syllable was transcribed with a numerical tone value. For example, /si55/ 'silk' was a syllables with high level tone. Here I adopt R. Cheng's tone system to transcribe these data. In R. Cheng (1977), the seven lexical tones are five long tones /55/, /53/, /33/, /21/, /13/ and the two short tones /53/ and /21/. In order not to mix the two long tones /21/ and /53/ with the corresponding short tones /21/ and /53/, in the clustering program later, I used /43/ instead of /53/ for the long tone /53/ and /22/ instead of /21/ for the short tone /21/. In my experiment, for the long tones, /55/ is used for high level tone, /33/ for mid level tone, /43/ for high falling tone, /21/ for low falling tone, and /13/ for rising tone.⁹ For the short tones, /53/ is used for high falling tone and /22/ for low falling tone.

Two speakers read the data. They are both bilingual, native speakers of Taiwanese in their twenties. Speaker A is from the Gaoxiong area and speaker B, the author, is from the Taizhong area. The two speakers recorded the data three times during a three-week period. They read the word list at a normal speed. The speech was recorded on a reel tape using a REVOX PR99 recording system. The recorded speech then was transferred from reel to cassette using a SANYO RD5030 stereo cassette recorder. Using the speech program described in section 2.1, I obtained the fundamental frequency of each

monosyllabic word in the recording. Seven parameters were extracted from each word and were stored on a file for the purpose of similarity grouping. Since both speakers read the data three times, the final file used for the grouping test for each speaker was the average of the parameters obtained for each of the speech words in the three recordings.

3.1.2 SIMILARITY GROUPING

All the parameters of the 280 words read by the two speakers were normalized at first within the range of 0 to 100. Thus, e.g. the highest frequency of speaker A's data (275.67 Hz) and the highest frequency of speaker B's data (248.50 Hz) were both set equal to 100. The lowest frequency of speaker A's data (149.00 Hz) and the lowest frequency of speaker B's data (133.67 Hz) were both set equal to 0. The remainder of the frequencies were normalized within this range.¹⁰ Since I assumed that there were seven citation tones, the program was written to cluster the data into seven groups. These data were clustered on the basis of the closeness of the parameters selected for similarity grouping. The K-means program first selected one word from each tone to be the initial center of each group. The mean values of each group depend on which parameters are selected as the clustering parameters. For example, if parameters "beginning point frequency" (BF) and "end point frequency" (EF) are the clustering parameters, then the BF and the EF of the initially selected group center are the mean values of that group. Next the BF and EF parameters of a second word were compared with those of the seven groups. This second word was added to the group whose mean values that the BF and EF of this word were nearest to, i.e. to the group which had the smallest distance between the parameters of the second word and the mean values of a group. The distance was calculated based on the pythagorean theorem: the distance between two points equals to the square root of the sum of the length of the sides. For instance, if I assume that the BFs and EFs of the center of one of the groups and the second word are (x_1, y_1) and (x_2, y_2) respectively, then the distance between the group and the second word is the square root of $((x_1 - x_2)^2 + (y_1 - y_2)^2)$. Next a third word was selected and added to a group based on the smallest distance difference between the parameter values and the group mean values. After all the 280 speech words were classified, new means were obtained for each group by first adding the clustering parameter value of each word collected in a group and then dividing the sum over the number of words in this group. For example, if BF and EF are the clustering parameters, then the BF values of all the words in the group are added together, then divided by the number of the total words in the group. Similarly the EF values of all the words are added, and the result is divided by the total number of the words in the group. These two newly averaged BF and EF values become the new center mean values. With these new means, all the data were classified again. This recalculation of group mean values and reclassification was repeated until the last recalculated mean values were the same as the previous ones. This means that the words clustered together in each group are stable. Words clustered in the same group can be said to have similar parameter values. The program then printed out the number of words and the words in each group. Since the grouping can be based on just one parameter, two parameters, or up to seven parameters, there are in total 127 combinations of the seven parameters. From this print-out, it is generally easy to tell which parameter or combinations of parameters can best distinguish among these seven tones. In the next section, I will discuss what the statistics can tell us about the citation tones in Taiwanese.

3.1.3 RESULT AND DISCUSSION

In total, there are 127 classification sets for the 280 experimental syllables based on the combination of the seven parameters. Among these 127 sets, I picked one classification shown in Table 1 based on four parameters: the beginning frequency, the mid frequency, the end frequency, and the tone duration for discussion. The combination

of these four parameters identified the citation tones best.¹¹ In Table 1, I observe the following:

The citation forms of 39 syllables transcribed with /55/ are collected in group 1. The citation forms of 40 syllables transcribed with /43/ are collected in group 2. The citation forms of 40 syllables transcribed with /33/ are collected in group 3. The citation forms of 35 syllables transcribed with tone /22/ and 35 syllables transcribed with tone /53/ are collected in group 4. The citation forms of 18 syllables transcribed with /21/ are collected in group 5 and the remaining 22 syllables are collected in group 6. The citation forms of 40 syllables transcribed with tone /13/ are collected in group 7.

The first three center mean values in each group in Table 1 are the normalized average frequency values for the beginning, the mid, and the end points. I convert each of these three mean values into the five-point scale tone system (Chao 1930). The normalized highest mean value 86.054 is interpreted as 5 and the lowest normalized mean value 11.351 is interpreted as 1. The pitch range from 5 to 1 is derived by first dividing the difference between 86.054 and 11.351 by 5, making an interval of 14.941. Next I subtract 14.941 from 86.054, which is the range for 5. Again I subtract 14.941 from 71.112, which is the range for 4, etc. The mean value range for each point in the scale is summarized in Table 2.

Table 1. Citation tone grouping using parameters BF, MF, EF, DUR

	group #	1	2	3	4	5	6	7
group mean values	BF	84.971	84.632	65.682	61.350	53.457	50.476	37.414
	MF	78.991	60.900	56.900	50.626	36.214	26.290	22.707
	EF	86.054	26.712	63.771	33.835	18.419	11.351	48.996
	DUR	70.333	37.480	73.799	12.928	17.281	48.411	78.042
	transcription tones	number of syllables in one of the seven tones collected in each group						
	55	39	0	1	0	0	0	0
	33	0	0	40	0	0	0	0
	43	0	40	0	0	0	0	0
	21	0	0	0	0	18	22	0
	13	0	0	0	0	0	0	40
	22	0	0	0	35	5	0	0
	53	0	0	4	35	1	0	0
total number of syllables in each group		39	40	45	70	24	22	40

BF: the beginning frequency; MF: the mid frequency; EF: the end frequency; DUR: tone duration

The decimal numbers beneath each group are the group center mean values.

Table 2. Tone letter assigned to each group in Table 1

numerical system		center mean values values		
5	from	86.054	group 1	55
	to	71.113	group 2	52
4	from	71.112	group 3	44
	to	56.172	group 4	42
3	from	56.171	group 5	31
	to	41.231	group 6	31
2	from	41.230	group 7	213
	to	26.291		
1	from	26.290		
	to	11.351		

Using Table 2, I can see that the experimental clustering groups represent six tone values: /55/, /52/, /44/, /42/, /31/, and /213/. Syllables transcribed with /21/ distributed in two groups 5 and 6, but they were all produced with tone /31/. The reason that the 18 syllables transcribed with /21/ in group 5 were differentiated from the remaining 22 syllables transcribed with /21/ in group 6 is that group 5 syllables were produced with shorter tone durations. However, this discrepancy will not influence the statistical result. Group 4 contains most of syllables in the short tones, which suggests that phonetically, there is only one short tone. Later, in the examination of sandhi tones, this short tone was found to have two sandhi forms. Another noteworthy item is that the duration mean values tell us that syllables produced in /42/ tone are comparatively shorter than syllables produced in other tones. The correspondence between the tone letters in the transcription and the computed citation tones from Table 2 is listed in Table 3. It is clear that the Taiwanese dialect R. Cheng (1977) studies has different tone values from my experimental data.

Table 3. Transcription tones and computed citation tones

transcription	computed citation tone	
55	<--->	55
33	<--->	44
43	<--->	52
21	<--->	31
13	<--->	213
53	<--->	42
22	<--->	42

<---> means 'corresponds to'

After we obtain the different citation tones, we will examine the sandhi tones that each citation form has in the sandhi environment.

3.2 SANDHI TONES

3.2.1 DATA

We made up 140 two-syllable phrases, each of which consisted of a monosyllabic word used in the previous analysis followed by a second monosyllabic word. There were 20 phrases for each tone. For example, /təŋ55 t'i~55/ 'winter', /to33 li43/ 'reason', /to~ŋ43 p'ai21/12 'political party', /si21 tsap53/ 'forty', /to13 tsau43/ 'escape', /kut53 to21/, 'slippery...fall', and /kut22 t'au13/ 'bone'. As before, all the monosyllabic words in the phrases were transcribed with the tone letters used in the previous experiment. The first syllable of each phrase was analyzed by the speech program. The seven parameters were extracted and stored. All the parameters were normalized between 100 and 0. Then, based on the combination of these seven parameters, these 280 tokens were classified by the K-means program in the same way as described in section 3.1.2.

3.2.2 RESULT AND DISCUSSION

One hundred and twenty-seven classification sets were obtained. It was found that parameters related to mid point frequency or slope do not play an important role in the two-word phrase classification. The best classification, then, is shown in Table 4, based on BF, EF, and DUR. Again, the normalized mean beginning and end frequency values for BF and EF of all seven groups were converted into the numerical equivalents. These converted tone values from Table 4 are listed in Table 5.

Table 4. Sandhi tone grouping using parameters BF, EF, and DUR

	group #	1	2	3	4	5	6	7
group mean values	BF	88.616	76.080	71.406	50.374	48.487	33.973	32.479
	EF	35.576	59.557	67.386	46.753	41.157	18.947	15.878
	DUR	42.987	7.040	64.305	73.917	42.361	12.320	56.782
	transcription tones	number of syllables in one of the seven tones collected in each group						
	55	0	0	3	13	22	1	1
	33	0	0	0	0	0	15	25
	43	0	0	31	9	0	0	0
	21	37	1	0	0	0	1	1
	13	0	0	0	14	18	1	7
	22	8	29	0	0	2	1	0
	53	0	1	0	0	0	34	5
total number of syllables in each group		45	31	34	36	42	53	39

BF: beginning frequency; EF: end frequency; DUR: tone duration

Table 5. Converted group tones in Table 4

group 1	52
group 2	54
group 3	44
group 4	33
group 5	32
group 6	21
group 7	21

In Table 4, some syllables transcribed with 22 and 53 had sandhi forms with long tone durations. I will discuss this later. At this moment, I will ignore syllables transcribed with short tones which are long. According to Tables 4 and 5, I have the following sandhi rules:

- (1) Syllables transcribed with 55 and 13 were produced in 33 or 32 tone, e.g. /si55/ 'poem' in [si33 lin213] 'a poet' and /si13/ 'time' in [si33 kan55] 'time'. The difference between 33 and 32 is not phonologically important.
- (2) Syllables transcribed with 43 were produced in 44 tone, e.g. /si43/ 'to die' in [si44 lang213] 'a dead person'.
- (3) Syllables transcribed with 21 were produced in 52 tone, e.g. /si21/ 'four' in [si52 tsap42] 'forty'.
- (4) Syllables transcribed with 33 were produced in 21 tone, e.g. /si33/ 'yes' in [si21 hui55] 'yes-no'.
- (5) Syllables transcribed with 53 were produced in 21 tone, e.g. /sit53/ 'solid' in [sit21 ue33] 'truth'.
- (6) Syllables transcribed with 22 were produced in tone 54, e.g. /sit22/ 'to lose' in [sit54 k'i31] 'lose'.

Using the derived citation tones from the first experiment, I rephrase the observed sandhi in (1) through (6) in Table 6.

Table 6. Computed citation and sandhi tones in Taiwanese

citation tones		sandhi tones
55,213	=>	33/32
52	=>	44
44	=>	21
31	=>	52
42(short)	=>	54(short)
42(short)	=>	21(short)

=> means the tone at the left
becomes the tone at the right.

In total, there are six sandhi tones. Clearly, citation tone /42/ has two sandhi forms /54/ and /21/. I would like to ask 'is there only one underlying short tone which takes two sandhi forms?' If the historical development of tone system in Chinese is taken into

consideration, underlyingly there are two short tones. Historically, the voicing split of the syllable-initial consonants in Chinese increased the tone inventory from four tones to eight tones. Each of the middle Chinese four tones, Ping, Shang, Qu, and Ru split into Yin and Yang, with Yin having high tone and Yang, low tone. From a diachronic point of view, there should be two short tones. This distinction is found in the sandhi forms but not in the citation forms in our data. I can postulate that underlyingly there were two short tones, and later in the language development process, the two short tones were neutralized in isolation in our data. Thus the sandhi forms serve as a criterion for the determination of the underlying short tones. Furthermore, if there is only one underlying short tone, it would be very difficult to predict when a syllable in this tone has a /21/ or /54/ sandhi from as the sandhi environment is the same. Because the distinction is maintained in the sandhi forms, Ho (1984) who studies Qingshui, a Taiwanese dialect that has one citation short tone and two sandhi short forms, proposes that the sandhi forms are actually the underlying forms and the citation form is a derived form. This postulation simplifies the prediction of sandhi forms. If the citation form is the underlying form, it would be difficult to predict when it is changed into one tone and when, the other. On the other hand, if the sandhi forms are the underlying forms, then the two tones are neutralized in isolation. Nevertheless, I cannot adopt Ho's view to assume that in my data the sandhi forms are the underlying forms. The evidence comes from another experiment of the tonal patterns before the neutral tone. Before I discuss the neutral tone experiment, I will devote a small section to the 'tone length' issue as from the direction that a short tone becomes a long tone, I obtain crucial evidence towards the establishment of the tone inventory in Taiwanese.

3.3. TONE DURATION

As noticed in Tables 1 and 4, when tone duration was one of the clustering parameters, some syllables transcribed with short tones both in the citation and sandhi environments were collected with syllables transcribed with long tones. Checking the average values of tone duration, I see that these syllables were collected in groups with large duration values. This indicates that these syllables were not produced with short tones but rather with long tones. In Table 7 I list some of these syllables and their tone durations in real time.

Table 7. Syllables transcribed with short tones produced long

citation context			sandhi context		
oʔ53	'study'	224 ms	tsio53	'stone'	149.00 ms
tsio53	'stone'	179 ms	tiʔ22	'drop'	137.65 ms
guat53	'moon'	159 ms	gik53	'jade'	142.33 ms

R. Cheng (1977) mentions that some syllables ending in the glottal stop drop the final consonant and are produced with a long tone in the sandhi environment, though they still keep the same short sandhi tone values as those syllables that do not drop the final consonants. In our data, not only /ʔ/ but other final consonants are dropped in both isolation and sandhi environments for some syllables. These syllables, after losing the final stop consonants, have different tone values. For instance, as shown in Tables 1, 3, 4, and 5, five syllables transcribed with tone /22/ in isolation context had a /31/ tone rather than a /42/ tone, e.g. /aʔ22/ ---> [a31] 'duck', and in the sandhi context eight

syllables had a /54/ sandhi tone, e.g. [a54 bu52] 'female duck'; four syllables transcribed with tone /53/ in the isolation context had a /44/ tone, e.g. /pe?53/ ---> [pe44] 'white' and in the sandhi context five syllables had a /21/ sandhi tone, e.g. [pe21 sik42] 'white color'. Here is a situation where the short tones are beginning to disappear and redistribute themselves among the long tones. These syllables are just the first few to undergo this change. Furthermore, after a syllable loses its final stop consonant, it has either a long /31/ or a long /44/ citation tone, which has either a /52/ or a /21/ sandhi tone. This observation helps me in the determination of the underlying forms of the short citation /42/ tone as discussed in the next two sections.

3.4 TONAL PATTERNS BEFORE THE NEUTRAL TONE

In Taiwanese, in addition to full tones, there is another tone category called the neutral tone (R. Cheng 1968, 1973, 1977, Zhang 1983). The distribution of the neutral tone is in general limited and predictable, so it is not regarded as a phonemic tone (Tung et al 1967). There are several environments where the neutral tone can occur and some turn out to be idiosyncratic¹³ (R. Cheng 1968, 1973, 1977). Any syllable produced in neutral tone loses its original full tone and has a low falling tone like /21/. For example, pronouns at sentence final object position, e.g. /gua52/ 'I' in [i33 ma-33 *gua21*] 'he scolded me' and directional verbs used as verb complement, e.g. [kue31 lai213] 'pass come' in [tan31 *kue21 lai21*] 'throw over here' have the neutral tone. Syllables immediately preceding the neutral toned syllables have been observed not to undergo any tone sandhi (R. Cheng 1968, 1973, 1977). I collected 42 phrases with final neutral toned syllables and these phrases were read by the same two speakers. The full toned syllable immediately preceding the neutral tone in each phrase was used in the K-means program and these syllables were transcribed with the computed citation tones in the citation tone experiment. Short /42/ tone with a /54/ sandhi tone is represented by /42(hs)/ and short /42/ tone with a /21/ sandhi tone is represented by /42(ls)/, where 's' stands for short and 'h' and 'l' stand for high and low respectively. Unfortunately, four of the neutral toned syllables spoken by speaker A had very low amplitude from which the fundamental frequency could not be extracted. So in total only 80 tokens were used in the clustering program. The clustering result based on the combination of BF (the beginning point frequency), MF (the mid point frequency), EF (the end point frequency), BESL (the beginning to end slope), BMSL (the beginning to mid slope), and MESL (the mid to end slope) and the converted group tone values are presented in Table 8.

I list the citation tones and the tones occurring before the neutral tone derived in Table 8 above. The long citation tones /55/, /44/, and /31/ were produced at lower pitches /44/, /33/, and /21/ respectively. An examination of the normalized frequency values shows that syllables of tone /52/ started at a much higher frequency than syllables of tone /55/. The beginning point frequency (BF) of syllables of tone /52/ was interpreted as 5; however, the BF of syllables of tone /55/ did not fall within the acoustic range for 5, and the BFs of syllables of tones /44/ and /31/ did not fall within the acoustic ranges for 4 and 3 respectively. Furthermore, as these syllables were preceded by another syllables, it is possible that the preceding syllable tone might have affected the frequency lowering of these syllables. Besides, the method I used to do the conversion sets an absolute rather than relative range for the frequency values. As a result, syllables of citation tones /55/, /44/, and /31/ had lower frequencies before the neutral tone than they had when produced in isolation. There is phonetic difference but phonologically there is no difference between the citation form and the form before the neutral tone. I would like to assume that phonologically syllables of these three citation tones /55/, /44/, and /31/ were produced with the same tones before the neutral toned syllables. Thus citation tones /55/, /44/, and /31/ still remain unchanged before the neutral tone.

Table 8. Tone grouping of the syllables before neutral tone using BF, MF, EF, BESL, BMSL, and MESL

	group #	1	2	3	4	5	6
group mean values	BF	98.554	76.552	61.476	61.412	41.954	40.343
	MF	65.182	76.552	42.427	51.004	29.770	42.409
	EF	41.185	71.724	31.704	51.114	24.943	65.801
	BESL	10.278	60.371	25.201	51.564	43.681	84.353
	BMSL	25.977	85.909	37.741	61.913	59.590	86.253
	MESL	17.227	41.039	30.325	55.075	37.193	82.255
	transcription tones	number of syllables in one of the seven tones collected in each group					
	55	0	8	0	1	0	0
	44	0	0	0	11	1	0
	52	12	0	0	0	0	0
	31	0	0	1	0	10	0
	213	0	0	1	1	0	10
	42(hs)	0	0	10	0	2	0
	42(ls)	0	0	1	11	0	0
total number of syllables in each group		12	8	13	24	13	10
converted tone values		52	44	32	33	21	24

BF: the beginning frequency; MF: the mid frequency; EF: the end frequency
 BESL: the beginning to end slope; BMSL: the beginning to mid slope; MESL: the mid to end slope

citation tones	computed tones
55	----> 44
44	----> 33
52	----> 52
31	----> 21
213	----> 24
42	----> 32
	33

As for the short tones, 10 syllables of tone /42(hs)/ had tone /32/ before the neutral tone, and eleven syllables of tone /42(ls)/ were produced with tone /33/ before the neutral tone. This means that in both speakers A's and B's speech, citation tone /42/ has two phonetic forms, a mid level /33/ and a low falling /32/, before the neutral tone. In the sandhi context, the citation /42/ tone had two sandhi forms /54/ and /21/. To assume that

there is only one underlying short tone could not explain why this tone would have two different forms in the above situations. Thus I proposed that there were two underlying short tones. At that moment, I did not know what the phonemic representation of these two tones would be. Since other tones like /55/, /44/, /52/, and /31/ do not undergo tone sandhi before the neutral tone, it would be less reasonable to expect only short tones to undergo tone sandhi. In this neutral tone experiment, two different phonetic forms, a mid level /33/ and a mid falling /32/ tones, were found with the short toned syllables. Since tones do not undergo sandhi before the neutral tone, the two phonetic tone values /33/ and /32/ shown on the short toned syllables can be said to be the surface forms of the two underlying short tones from which the sandhi tones are derived. One of the underlying forms of the short tones is a mid level tone and the other is a mid falling tone. These /33/ and /32/ tones are different from the sandhi /33/ and /32/ tones derived from the /55/ and /213/ citation tones as the former are perceptually different and the latter are perceptually the same. Besides, the pitch of the short /32/ and /33/ tones could be lowered because of the preceding syllable tone in speech production just like the /55/, /44/, and /31/ citation tones. These two short tones could have started at a higher pitch. If Ho's claim (1982) that the sandhi tones are the underlying tones was valid, I should have found tones /54/ and /21/ for the short toned syllables before the neutral tone. However, the result from this experiment proves that as far as our data are concerned, the general sandhi forms are not the underlying forms.

Finally, syllables of citation tone /213/ had a /24/ tone. Since all other tones remain unchanged when followed by the neutral tone, I propose that /213/ is actually a rising tone phonologically. The falling effect in /213/ when it was produced in isolation may be due to the fact that it is more difficult for vocal cord to start at the lowest pitch in a person's pitch range. As a result, this tone is produced at a higher beginning pitch then dropped down. Maddieson (1976) states that quite often the 'extreme' tones of a system are preceded by a central onglide. For example, a /11/ tone is produced as /21/ and a /55/ tone is produced as /45/. As to whether this rising tone is a high rising or a low rising tone, the answer will be given in section 4.

As the tone before the neutral toned morphemes does not undergo any change, e.g. /au44/ 'after' in [au44 *li*21] 'the day after tomorrow', I take the phonetic forms before the neutral tone as the basis for postulating the underlying tones. Based on these forms I establish the tone inventory in Taiwanese. In order to facilitate the tone transcription, I will still use the number system to transcribe the tones. Thus I also set up a unified transcription system even though the acoustic variation is evident in the experimental data.

4. TONE INVENTORY IN TAIWANESE

The high level and mid level tones were calculated as /55/ and /44/ in the citation tone experiment, and /44/ and /33/ in the neutral tone experiment respectively. The reason is that high falling tone usually starts at a higher pitch than a high level tone. If the pitch of the high falling tone is considered to be 5 in the calculation, then the pitch of a high level tone might fall into the range of 4 and that of a mid level might fall into the range of 3 depending on how high the high falling tone starts. The lowering in the neutral tone environment could be influenced by the preceding low toned syllables. So the difference is only a matter of acoustic variation. In order to make these two tones look more distinctive from each other, /55/ is chosen for high level, and /33/ for mid level. They have general sandhi forms /33/ and /21/ respectively in the sandhi tone experiment, and therefore, /33/ and /21/ are used to represent the sandhi forms. The high falling tone always had a /52/ phonetic form in the citation and neutral tone experiments, thus /52/ is used to represent the underlying form of this tone. Two phonetic forms /31/

and /21/ were obtained with the long low falling tone. Since this low falling tone is perceptually identical to the general sandhi long low falling tone /21/ of tone /33/ obtained in the general tone sandhi experiment, I will assign /21/ to this low falling tone. The general sandhi form of underlying /52/ tone was calculated as /44/ which is distinct from the /33/ sandhi form of the underlying /55/ tone in the sandhi environment. I have mentioned above that because of the extra high of a high falling tone, in the conversion process a high level tone can have a /44/ rather than /55/ value if its beginning frequency does not fall into the frequency range of 5. This calculated /44/ is higher than the /33/ general sandhi form of underlying /55/ tone and is considered a high level tone, so I decide to use /55/ instead of /44/ to represent the high sandhi level tone. The general sandhi form of low falling tone /21/ is /52/ in the general tone sandhi experiment and I use /52/ to represent its sandhi form.

In the citation tone experiment, I obtained a falling-rising contour tone /213/. But syllables in this tone before the neutral tone were calculated to have a /24/ tone. Since I treat the tones before the neutral tone as the basis for the underlying forms, I say that the underlying form of this falling-rising contour tone is a rising tone. The initial falling is due to the articulatory factor that this tone starts at a low pitch, thus it is possible to have a gliding contour in the beginning. However, it is somewhat difficult to determine whether the rising tone is a low rising /13/ or a high rising /24/. In Taiwanese, the first syllable of a triple adjective reduplication phrase must have a high rising /35/ tone, e.g. [ki35 ki33 ki213] 'extremely strange'. If the underlying rising tone of /213/ is perceived to be the same as this sandhi tone /35/, I can postulate the rising tone to be high; otherwise, it is low. Thus I did a perceptual test asking 14 native speakers of Taiwanese to identify whether the rising sandhi tone of the first adjective syllable sounded the same as the rising tone of a third syllable in the triple adjective reduplication phrases. The test utterances consisted of 80 pairs of monosyllabic words. The two words in each pair could be the same, i.e. they both were the extracted first syllables of a triple adjective reduplication phrase, e.g. [liau35] 'wrinkled', or they both were the extracted third syllables of a triple adjective phrases whose citation tone was /213/, e.g. [liau213] 'wrinkled', or one of the two words was the first syllable and the other was the third syllable, e.g. [liau35] and [liau213]. These 80 pairs were randomized in the test utterances and the subjects were asked to judge whether the two words in each pair sounded the same, or the first one was higher and the second one was lower, or the first one was lower and the second one was higher. The result shows that of the 1120 answers, 1119 indicated that the first syllable sandhi /35/ form was higher than the third syllable citation /213/ form. According to the perception result, I propose the rising tone to be a low rising /13/ underlyingly.

Of the two short tones, one is a mid level and the other is a mid falling tone. The mid level was calculated as /33/ in the neutral tone experiment and was also calculated to have the same sandhi /21/ tone as the long tone /33/ in the sandhi context. Besides, when a syllable in this short tone lost the final consonant, its tone became long /33/. Based on the similar tonal behaviors of these two tones in different environments, I assume that the long and the short mid tones are derived from one underlying mid level tone /33/. The length difference can be predicted from the syllable final stop consonant.

The phonetic mid falling short tone was calculated as /32/ in the neutral tone experiment. Since this mid falling tone is lower than the high falling tone /52/ and higher than the low falling tone /21/ phonetically, I use /32/ to represent its phonetic form. This short tone /32/ was calculated to have a general phonetic sandhi tone of /54/ in the sandhi environment, and the long /21/ tone was calculated to have a /52/ sandhi tone in the same sandhi environment. The short sandhi /54/ tone is very similar to the long sandhi tone /52/ as both are high falling tones. I would like to assume that phonologically these two

high falling tones are the same. The end frequency difference is due to the shortness of the checked syllables, i.e. syllables ending in stop consonants, which makes the short sandhi tone /54/ not to drop as low as the longer /52/ tone. Thus these two tones, long tone /21/ and short tone /32/, were calculated to have the same sandhi tones in the sandhi context. Moreover, in the clustering experiment, a syllable in this short tone, after losing its final consonant, was clustered with syllables of the long /21/ tone, both of which had a long /52/ sandhi tone. This means that when this short /32/ tone becomes a long tone, it merges with the tone that has similar sandhi tones. Based on the similar sandhi behavior and that this short /32/ tone merged with a similar long tone after its syllable lost the final stop consonant, I assume that the long /21/ tone and the short /32/ tone are derived from one underlying tone /21/. On the surface the short low falling tone is produced with a higher pitched /32/ tone than the long low falling /21/ tone before the neutral tone contexts.

Since the long and short /33/ phonetic tones are derived from one underlying tone /33/ and the long and short /21/ and /32/ tones are derived from one underlying tone, our Taiwanese data have only five tones phonologically. They are /55/, /52/, /33/, /21/, and /13/. But there are six citation tones, five long tones, /55/, /52/, /33/, /21/, and /213/, and one short /42/ tone. The two short forms derived from underlying /21/ and /33/ tones surface as a /42/ tone when they are produced in isolation or at the final position of a tone sandhi domain. Before the neutral tone /21/, these two short tones surface as tones /33/ and /32/ respectively. The underlying rising tone /13/ is produced as a falling-rising /213/ tone in isolation and a rising /24/ tone before the neutral tone /21/. For all of the other tones, the underlying and citation tones are the same.

5. CONCLUSION

In this paper, I introduce a method which incorporates computer techniques and a pattern matching algorithm to perform the classification of tones in Taiwanese. MacQueen (1965:288) states, "the purpose of K-means is not to find some unique definitive grouping, but rather to simply aid the investigators in obtaining qualitative and quantitative understanding of large amounts of N-dimensional data by providing them with reasonably good similarity groups." The success of this algorithm depends on the classification groups selected. As shown in this paper, first the classification results have helped me discover the tone inventory and possible phonetic tone sandhi in my Taiwanese speech data. Second, these results also suggest a language development process which gives me an idea of how the short tones may have disappeared in some Chinese languages, e.g. Mandarin, where short tones no longer exist. It is true that some linguists could have derived the same results by perception. However, it is also true that not all linguists are able to dictate different tone patterns just based on perception. The tool I describe here could be of great help to the above linguists because it provides them with a rather dependable tool for the study of tones in addition to perception. Furthermore, using different combinations of parameters to classify tones could provide linguists in speech synthesis with valuable information in the production of human-like tones. Finally from the classification results, we have found that some syllables transcribed with short tones had an average tone duration between long tone duration and short tone duration. These are the syllables that are in the process of losing syllable final consonants and gradually assume a long tone. This kind of tone length change is not easy to detect perceptually. Using this program in the study of Taiwanese or Southern Min language, the linguists can have an idea about the process of short tones becoming long tones in different Southern Min dialects. As mentioned earlier, I do not claim that the tool could replace perception as the only dependable method in the study of tones. It is rather a mechanism to help those linguists with less confidence on their speech perception of tones. They could obtain as solid evidence towards the tones by using this

tool as by speech perception. And what I have described here is just the beginning of incorporating some non-linguistic techniques into the field of linguistic study. I hope in the future there will be more use of other computational and statistical techniques to aid the study of linguistic phenomena.

NOTES

¹I am very grateful to Prof. C. C. Cheng for his guidance during the preparation of this paper. I also would like to express my gratitude to Mr. Matthew Ratta for his help with the K-means algorithm and the computer software programming, to Ms. Dorothy Evans and Mr. Steve Helmreich for their valuable suggestions and comments, and to Ms. Rachel Manwell for her help in the speech recording.

²Taiwanese is a dialect of Southern Min language. It is spoken by about 10,000,000 people in Taiwan (Zhang 1983).

³The actual environment for the sandhi tone should be the non-final position in a tonal group. For detailed description, see Chen (1986).

⁴Due to typographic reason, the glottal stop /ʔ/ is represented by /?/.

⁵The A/D and D/A converter DT2801A was designed by Data Translation Inc.

⁶According to Nyquist's criteria, the sampling rate should be twice the highest frequency of the voice to be sampled. As female voice is higher than male voice, the sampling rates for male and female voices are 10 K and 20 K respectively.

⁷For these three functions, please refer to the references.

⁸Of course, this algorithm only works for monosyllabic words. For poly-syllabic words, the program included a splicing function which could extract a syllable from an input signal and store this syllable speech signal on a disk. Later, this syllable speech signal was loaded and the seven parameters were obtained by the above algorithm.

⁹In R. Cheng (1977), there is no falling-rising tone. Our experimental data, however, show that "13" is a falling-rising tone. However, I still use 13 to represent this tone in the computer program and transcription.

¹⁰The normalization equation is $100 \times ((\text{frequency} - \text{lowest frequency}) / (\text{highest frequency} - \text{lowest frequency}))$.

¹¹The tone identification performance is determined as follows. When I prepared the experiment data, there were 20 monosyllabic words for each tone. Each of the two speakers read 140 words, so there were 40 words for each tone. If each of the seven groups contains only one tone and the number of words with this tone is 40, then the identification performance is equal to the sum of all words in the seven groups divided by the total speech words (280/280), which is a 100% perfect grouping performance. If a group contains words in one tone and the number of words is less than 30, then the performance is not good. This group is dropped. If there are words in different tones included in one group and the number of words in one of the tones is either greater than 10 or less than 30, this group is discarded. Otherwise, the number in each group is added together and the sum is divided by 280. The result is the performance percentage.

¹²Due to typographic reason, the back vowel /ɔ/ is written as /o/.

¹³For example, in the phrase /au44 lit42/ 'after day', with neutral tone on /lit42/ [au44 lit21] this phrase means 'the day after tomorrow'; with both syllables in full tones [au21 lit42] this phrase means 'future'.

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Donna M. Farina

MULTIWORD LEXICAL UNITS IN FRENCH

This paper will discuss multiword lexical units in French. I will demonstrate the methods used to determine whether a combination of words does in fact behave as a single unit, or whether it is simply a free, but frequent combination. The demonstration will use as example the combination *chemin de fer* (along with other examples), and will be based, for the most part, on the nine tests for multiword units given in Zgusta (1971: 138-159). This demonstration has two purposes. The first is to show in detail one aspect of a more general lexicographical problem, that of determining what should or should not be a separate dictionary entry. In other words, the question being asked is: how does the lexicographer decide whether a combination will have its own entry? The second purpose is to allow for a more informed appraisal of a French dictionary's actual treatment of multiword lexical units. Thus, the paper will look at dictionary entries in the *Petit Robert* (1979). When it is pertinent to do so, these entries will be compared with those of the one-volume *Littré* (1958); but the main object of interest here is the *Petit Robert*. Lastly, the larger six-volume *Robert* (1966) will be briefly examined, only in order to determine whether the necessity to save space played a role in the one-volume *Petit Robert*'s treatment of multiword lexical units.

I. The Nine Tests.

One can define a multiword lexical unit with respect to its function, and this is how I am using the term here. A multiword lexical unit, then, is a lexical unit consisting of more than one word, which functions in a sentence in the same way as do lexical units of

a single word. Thus it is appropriate that the following tests for multiword lexical units (henceforth abbreviated MLU) test their function.

The combination *chemin de fer*, as will be seen by the tests to follow, is a clear case of a MLU. In the *Petit Robert* (p. 298), it is given its own entry, separate from the entries of both *chemin* and *fer*. The *Petit Robert* notes the two earliest occurrences of this combination; first, in 1787 as a translation of *railway*, and secondly, in 1823 when the railroad between Saint-Étienne and Andrézieux began service. This information shows that *chemin de fer* came from the translation of an English single word lexical unit consisting of two morphemes, each of which may also occur independently.

The *Petit Robert* organizes definitions for an entry in historical order. For *chemin de fer*, the first definition is marked Vx. 'vieux', indicating that this meaning is rarely used now. This definition reads: "Chemin formé par deux rails parallèles sur lesquels roulent les trains." The second definition, marked Mod. 'moderne', reads: "Le moyen de transport utilisant la voie ferrée; l'exploitation de ce moyen de transport." The third definition is the company which uses the railroad lines for profit; the fourth, a toy train set; and the fifth is a casino money game.

The significance of this definition is twofold: first (as was noted above), that there is a separate entry, indicating that the lexicographers of the *Petit Robert* regarded *chemin de fer* as a separate unit; and secondly, that the meaning of this combination was extended, from the older specific meaning of 'train track' to the more general, modern meanings of 'means of transportation', 'utilization of this means', and 'company profiting from this means'. Note that the meaning was also extended metaphorically to the casino game; in the same way, English *guinea pig* has come to mean a person used as a subject for experiments, alongside its original meaning of a species of animal often used in experiments (cf. *The Pocket Oxford* 1978: 385; *The American Heritage Dictionary* 1969). It will be seen later that other combinations in French which clearly seem to be MLUs, but which are not given separate entries by the lexicographers, may be distinguished by the lexicographers from *chemin de fer* in part by apparent lack of extended meanings.

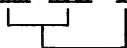
The first test for multiword lexical units, is, of the nine to be

discussed, one of the two most important: the test of 1) **commutation or substitution**. In order to discover whether a combination is simply one of great frequency of occurrence in the language, or whether it functions as a unit, one can replace for each part of the combination a word of the same or similar meaning. If the new combination resulting from this operation has a different meaning from the original combination, then the original combination is probably a multiword lexical unit. For *chemin de fer*, if *route* or *voie*, which have roughly the same meaning as *chemin* 'path', are substituted for *chemin*, the resulting combinations *route de fer* and *voie de fer* do not have the same meaning as *chemin de fer*. These could mean 'road of iron' if they mean anything at all, but in no case could they mean 'railroad'. Likewise, when names of other metals, such as those meaning 'steel' and 'bronze', are used in place of *fer* 'iron', the new combinations with *chemin* do not mean 'railroad', but only different types of roads: *chemin d'acier* 'road of steel', *chemin de bronze* 'road of bronze'. A further test could be a substitution of something with the connotative meaning of *de fer*, 'of strength or durability' (note the English *nerves of steel, Iron Horse*). But here too, *chemin de force* has nothing in common with the meaning of *chemin de fer*. Finally, note that the combination *chemin de fer* could itself have the meaning 'road of iron'. With this meaning, it would be a free combination (as the possibility of having an equivalent *voie de fer* shows), and it would thus contrast with the set combination of the same form, meaning 'railroad'.

The second possible test for a MLU is 2) to add something to the combination under scrutiny. Often, but not always, one cannot add to a MLU. In the case of *chemin de fer*, an adjective can only modify the whole, and not part of the whole. Thus, the following have no meaning in French:

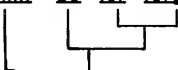
*chemin neuf de fer

neuf: 'new'



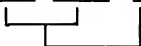
*chemin de fer forgé

forgé: 'wrought'

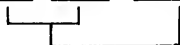


while the following do have meaning:

chemin de fer neuf



chemin de fer métropolitain



Note that this alone is not a sufficient test for a MLU. For instance, some combinations with *chemin* which one would not want to call MLUs may also not be added to, like *chemin de terre*:

*chemin de terre abrupt

'road of coarse earth'



But,

chemin de terre abrupt

'rough earthen road'



However, Šabrušula (1966) makes clear that the real significance of this test is not necessarily that one can add to a given combination (or where one can add), but rather how what is added functions with respect to the whole. For example, Šabrušula cites the MLU *avoir faim* 'to be hungry' in the sentence, "L'enfant a très faim," 'the child is very hungry'. He notes that the combination, though fixed, is not so fixed that it prevents an adverb like *très* from being inserted between the two words of the combination, in order to modify the combination as a whole. Thus, "le syntagme *très faim* n'existe pas en français [as in: *(La) très faim des enfants], pas plus que *a très*. *Très*, du point de vue de la sélection, peut être combiné à une unité onomatologique complexe remplaçant un verbe." Thus, this test should be used with prudence, as it will not always be applicable to all MLUs.

The third test for MLUs again will not apply to all such units. Here one determines whether 3) the meaning of the combination is fully derivable from its parts. If it is not, one is dealing

with a MLU. Mathiot (1967) calls this *gestalt meaning*: "the meaning of the whole being more than the sum of the meanings of the parts." *Chemin de fer* obviously passes this test; as was noted earlier, the whole meaning, 'railroad', is not derivable from the meaning of the parts, 'road of iron'. The original meaning of *chemin de fer* had as criterial feature a road made of two parallel rails; even if these rails were a blend of metals (instead of just being made of iron), one would presumably still have a *chemin de fer*. In the extended definitions of *chemin de fer*, the meaning is totally divorced from that of its parts.

Note that a combination whose meaning *can* be derived from its parts is not ruled out as a possible MLU. This criterion therefore identifies positively, but not negatively, MLUs. (This will become important later in the discussion of *chemin de halage*.) For this reason, in her work in compiling a Papago-English dictionary, Mathiot found that the criterion of *gestalt meaning* alone was not operational for determining the units of the lexicon. She noted the necessity of structuralist techniques such as those in the first and second tests above. Thus, this third test can be a corroborating test for MLUs, but may not be used by lexicographers as the basic one, when they attempt to determine what the entries of a dictionary should be.

The fourth test is that 4) one of the words of a MLU may be restricted in use, and this does not apply to the combination being discussed here, *chemin de fer*. This means that a word within the MLU may only be used within the set combination of which it is a part, or it may be used there and in only a few contexts. The *Manual of Lexicography* (1971: 148) cites the word *maid* in English *old maid* as an example of this. An example in French comes from Duneton (1978: 249). The expression *perdre la tramontane* means, according to the *Petit Robert* (p. 1999), "être désorienté, perdre le nord." In the modern language, *tramontane* means "vent du nord". Only in this expression, however, does *tramontane* retain its archaic meaning of 'North Star'. And that this older meaning is really unknown to the average modern French person can be assumed by the expression's inclusion in a book attempting to explain popular expressions for the general reader.

On the other hand, neither *chemin* nor *fer* is restricted in usage. With *chemin*, one finds such free combinations as: *chemin neuf*, *chemin descendant*, *passer par un autre chemin*, *chemin de*

montagne. With *fer*, we have: *fer forgé*, *fer battu*, etc. Nevertheless, this test can be a very useful indicator of a MLU.

The next test is 5) to find a synonym or near-synonym consisting of only one word. For *chemin de fer*, there is the one word equivalent, *rail*. In the *Petit Robert* (p. 1596), the second definition of this word reads: "Transport par voie ferrée." This corresponds to the second definition of *chemin de fer*. A quotation given by the *Petit Robert* under *rail*: «L'espèce de compétition qui oppose le rail à la route», could easily have *les chemins de fer* in place of *le rail*, according to a native French speaker. Thus, *chemin de fer* functions as does a French single word lexical unit.

The sixth test is: 6) to find a paradigm of semantically related expressions where MLUs have identical status with single words. The quote with *rail* above gives us a clue to such a paradigm; one could have, for instance, a paradigm of words denoting means of transportation, *la route -- le rail -- l'air -- les chemins de fer* *Chemin de fer* is of equal status with the other members in the paradigm, all of which are single words.

The next test is to go from the language of study to foreign languages, and asks, 7) are there single word equivalents for the combination in foreign languages. For the equivalent in meaning of *chemin de fer*, the languages English, German, and Rumanian all have single word lexical units. English has the older *railway*, and *railroad*. German has *Eisenbahn* (*Eisen* 'iron', and *Bahn* 'path'), Rumanian has *drum-de-fier* (*drum* 'chemin'; and *fier* 'fer'). Rumanian has as well the set combination *cale ferată* with the meaning 'chemin de fer'. Russian has only the set combination *železnaja doroga* for *chemin de fer*. Note that in the first three languages, the single words consist of morphemes which may also be used as single words themselves. This criterion is like that of gestalt meaning (number 3), in that it is a positive, not a negative criterion; even if no single words could be found in other languages for a given combination, one may not rule out the possibility that it functions as a single unit.

The eighth test is to: 8) look for special formal, grammatical criteria in a MLU. This is not applicable to *chemin de fer*, but can be demonstrated by the expression mentioned earlier, *perdre la tramontane*. Šabrušula (1966) notes that the impossibility

of passivizing expressions like this one, which seem to correspond to the model verb + direct object, is a sign that one is dealing with a unit which is indivisible lexicologically as well as syntactically. Thus, one cannot have: **La tramontane est perdue*. Another expression functioning in this way is *tuer le temps*; as in English, one could not say: **time is killed*.

Martinet (1970: 194) cites *avoir l'air* as an example of an expression with special grammatical properties. He attributes, it should be noted, "le figement du syntagme" to the fact that it occurs with a high frequency, but function and not cause is of interest here. Martinet notes that an adjective following this expression will agree with the subject of the phrase and not with *air* (masculine noun); thus, "*elle a l'air gentille*" 'she seems nice'. He further notes that in the speech of children, the entire expression is treated like a verb, and is conjugated: "**ça m'alairait bon" is heard instead of the correct: "ça m'avait l'air bon." Although it is natural that children overgeneralize when they are learning their language, this particular overgeneralization does vouch for the perceived unity of the expression *avoir l'air*.

The ninth criterion is closely related to the fifth test, that of finding a one word synonym for a combination. This last criterion asks the question: **9) does the combination function as a single word?** It was shown above that *chemin de fer* can indeed function as does its one word synonym, *rail*: Its role in a sentence is the same as the role of a single word. This criterion, as the *Manual of Lexicography* (p. 150-1) notes, is used to distinguish set groups from set combinations. thus, an expression *jeter de la poudre aux yeux* 'to fool' (Duneton 1978: 306), though definitely a set expression, does not behave as one word in a sentence, while *chemin de fer* and *avoir l'air* do. This criterion and the first criterion (commutation) are the two most fundamental in determining the MLUs of a language.

To end this section on 'discovery' techniques for MLUs, I would like to propose a tenth criterion, and then add a note of caution. In the *Manual* (p. 144), it is mentioned that "the only possible change in a multiword lexical unit seems to be the dropping of one of the constituent elements ..."; and that this dropping is elliptical, occurring only in disambiguating contexts. A famous example of such a change through time of a MLU is Martinet's (1970: 187-8) *chemin de fer métropolitain*, which became first *le métropolitain*,

and then *le métro*. However, it often happens that multiword lexical units are used in some contexts in their full form, and in others in an elided form (when none of the contexts are ambiguous) -- in the same synchronic state of a language (This was most probably the case with *chemin de fer métropolitain - métropolitain*, and later with *métropolitain - métro*.) For example, *chemin de fer* can be referred to as simply *fer*. Under *fer* in the *Petit Robert* (p. 770) this example appears: «Transport par fer et par air.» This context is unambiguous: *fer* here means *chemin de fer*. In light of examples such as these, I propose that a tenth test of MLUs would investigate ellipses of parts of combinations. If these were found to exist, this would be still further evidence of a MLU, if the combination also met some of the criteria mentioned above -- including the two most important criteria (commutation and single-word function in a sentence).

As was said earlier, and as has been shown by the above tests, *chemin de fer* is a very clear case of a MLU. But the reader should be warned, for it is not too strong a statement to say that *chemin de fer* is for this reason exceptional. This combination was chosen here because it is very good for illustrative purposes: almost every test could be applied to it. But in reality, there is no line to draw between free and set combinations, and making a decision on the status of a combination can be a problem for the lexicographer. Thus, the reason for having many different ways of analyzing combinations -- so that a lexicographer can make as intelligent a decision as possible about the combination's status.

II. Treatment of MLUs in the *Petit Robert*.

The first section of this paper has shown how to determine what are the MLUs in a language, and has indicated the difficulties that a lexicographer can face in determining a combination's status. But the problem of determining what should have a separate dictionary entry has not yet been addressed. For, even if a lexicographer considers a combination a MLU, this does not necessarily mean that it should have its own entry. Among other considerations, there is the problem of space, and more entries take up more space. This being the case, several questions must be raised: if a lexicographer decides against giving a MLU its own entry, what then is done with it? Is it put under the entry of the first word of the unit, or is it put under the entry of the most

important word? If the lexicographer does either of these two things, does she give a cross-reference for the hapless reader who looks in the wrong place? And lastly, wherever she puts it, how does the lexicographer indicate to the user that the status of the MLU is different from that of a free combination that might be used for an example? I will attempt to answer these questions by examining the treatment of MLUs by the *Petit Robert*, with some comparisons to the *Littré*.

First of all, it will be interesting to look at what the *Petit Robert* itself says about MLUs, to see if we can thus discover the lexicographer's answers to the above questions. In the introduction by Alain Rey, the traditional treatment of MLUs is discussed (p. X). Rey notes, for example, that a set combination like *pomme de terre* 'potato' will usually be lost under the numerous examples of the word *pomme* 'apple'. That this is indeed the case is easily discovered by examining the *Littré* (1958: 924). Likewise in this dictionary, *chemin de fer* is buried under the entries of *chemin*, with no entry of its own (p. 206). Given the problems of MLUs, it is not surprising that a dictionary would choose to treat them alike across the board, by reserving entries for single word units, and thus avoiding the difficulty. But the *Petit Robert* proposes something different, under a paragraph entitled "Où et comment trouver un mot?"

Il nous a paru plus raisonnable de donner à l'ordre alphabétique ces vrais composés que sont *pomme de terre*, *chemin de fer*, ou *point de vue*. De tels procédés ne peuvent pas être appliqués systématiquement dans un dictionnaire, sous peine d'augmenter excessivement le nombre des "mots" traités et le volume de l'ouvrage. Cependant, quand certaines expressions ou formes verbales, moins importantes, constituaient de véritables mots (on dit alors qu'elles sont lexicalisées), elles ont été présentées en capitales dans les articles où elles sont incluses, pour attirer l'attention sur leur autonomie. Ainsi: EXCÈS DE POUVOIR (à l'article *excès*), la locution À L'EXCEPTION DE (sous *exception*), la locution COMME IL FAUT, qui s'emploie comme un adverbe ou comme un adjectif (à *falloir*). (p. X)

There are many things to note about the above passage. Although at first glance there appears to be a very systematic treatment of the

problem of MLUs, there is no explanation of what criteria allowed the lexicographers to distinguish between 'more' and 'less' important expressions or verbal forms. Without this information, it would be hard to guess why *pomme de terre* is more important than *excès de pouvoir*; perhaps it is frequency or length of time that the set expression has existed in the language that distinguishes the two. But, a few words will be said on this later.

Another criticism that one can make is that the information contained in this passage is present *nowhere else* in the dictionary: no table of abbreviations or table of any kind explains this use of capital letters to designate set combinations. Since it is doubtful that the average person ever reads the introduction to a dictionary, this information is close to useless. But the situation becomes more complicated in light of additional information which the *Petit Robert* includes.

In a later part of the introduction (p. XV), Rey discusses what he calls "syntagmes", or "groupes de mots". He states:

On comprendra sans peine qu'il faut distinguer entre les exemples d'auteurs ou les phrases anonymes qui procèdent d'un choix nécessairement arbitraire, et les groupes de mots qui ne laisse aucun choix, aucune liberté au parleur ou à l'écrivain.

As an example of a group where one has no choice of words, Rey cites *fièvre de cheval*, a very high fever, under the entry *fièvre*. He says:

Ici, le français courant n'a plus le choix: il est impossible de parler d'une "fièvre de vache" ou "de poney"; impossible même de dire: "il a une fièvre de petit cheval" ou "de cheval de labour", sauf en vue d'un effet de style.

Cet exemple aidera à comprendre la différence qui existe entre une *suite de mots* fréquente mais modifiable ..., et une *suite de mots intangible* ... aussi indispensable à connaître que le mot lui-même.

From this information, it is impossible to tell if Rey regards these "suites intangibles" as the same type of entity as the "composés" mentioned earlier in the introduction. These "suites de mots"

certainly do have many of the same characteristics as the "composés"; for example, one could not say **orange de terre* instead of *pomme de terre*. But, nevertheless, the dictionary proposes to treat these "suites" in a manner differing slightly from that of the "composés" discussed earlier:

Pour la commodité du lecteur, il faut préciser que ces groupes de mots intangibles se trouvent le plus souvent mentionnés sous leur principal élément: *faire fête*, à *fête*; *feu de joie* et *coup de feu*, à *feu*. Quand le groupe aurait pu être classé à deux ou même à trois endroits, le mot où le groupe est traité a été signalé par un astérisque. Ainsi, *mettre le feu aux poudres**; *feu follet**, dans l'article *feu*, signifient que les explications et éventuellement, les exemples se trouvent à *poudre* et à *follet*. (pp. XV-XVI)

This information, again, is stated nowhere else in the dictionary. On the whole, the introduction renders less than clear the problems of MLUs. (Note also that there is no distinction made between set combinations such as *coup de feu*, and set groups such as *mettre le feu aux poudres*, by the use of the asterisk notation.) Thus, one must go to the dictionary itself, to see if the treatment of these units can be understood, and if this treatment is consistent. To determine this, I will again look at *chemin de fer*, along with other expressions.

The first entry to be discussed is that of *chemin* (*Petit Robert*, p. 298). Since *chemin de fer* has its own entry, it is not mentioned anywhere under *chemin*. The entry for *chemin* makes use of the capital letters technique once, for CHEMIN DE RONDE 'parapet walk', and the asterisk technique twice, for *Le chemin de la croix** 'way of the cross', and *Le chemin des écoliers** 'long way around'. One expression which has neither asterisk nor capital letters is *chemin de halage* 'towing path', defined briefly by "sur une berge". But this combination nevertheless does seem to show characteristics of a MLU. Under *halage* (note that there was no asterisk to warn us to look under *halage*), we find a more complete definition: "*Chemin de halage* et ellipt. *Le halage*, chemin qui longe un cours d'eau pour permettre le halage des bateaux." (p. 908)

Thus, we see that *chemin de halage* has an elliptical equivalent. When we look up two words noted as being associated

with *chemin de halage*, we find, first under *lé*: "Largeur d'un chemin de halage; *par ext.* Ce chemin." (p. 1080) So, *chemin de halage* has a one word equivalent in French, and it functions in a sentence in the same way as does one word, or as does *chemin de fer*. Under *marchepied*, also indicated in the definition of *chemin de halage*, we find one definition which reads: "Chemin qui longe un cours d'eau sur la rive opposée au chemin de halage." (p. 1152) Thus, *chemin de halage* can be said to be part of a paradigm with one word lexical units: *chemin de halage* -- *marchepied* -- *lé*.

Note that *chemin de halage* does not meet the third criterion, of gestalt meaning: the meaning of the whole is easily derivable from that of its parts. But, as was said earlier, this is not a criterion of primary importance. All that this might tell us is that on a continuum, we might want to rank *chemin de fer* as being 'more MLU-like' than *chemin de halage*, although both should still be considered multiword lexical units.

I have briefly shown that *chemin de halage* is a MLU; however, this is not meant to argue that it needs its own entry. If one measures the total length of the entries *chemin* and *chemin de fer*, one finds that they take up 25.6 centimeters in the *Petit Robert*. On the other hand, the space taken up by *halage* (the word that *chemin de halage* is defined under) and *chemin de halage* together is only 1.3 centimeters. The small amount of space required by these two definitions does not merit two separate entries. On the other hand, one can and should argue that the status of *chemin de halage* as a MLU should be indicated by the *Petit Robert*; furthermore, under *chemin*, there should be a cross-reference to *halage*, using the asterisk notation. All this would only be a consistent realization by the lexicographers of what they claim to do in the introduction.

A footnote to the above observations may be added: earlier, in the enumeration of the definitions of *chemin de fer*, it was mentioned that perhaps MLUs without separate entries in the dictionary lack extended or multiple meanings. This speculation brings us again to the *Petit Robert*'s criterion of more and lesser importance of MLUs. One can see, when one compares the definitions of *chemin de fer* with the single meaning of *chemin de halage*, that this indeed seems to have some relevance; *point de vue* (p. 1470), mentioned in Rey's introduction, also has extended meanings. However *pomme de terre* has only two definitions, although these are fairly long (once examples are included). To finish with this

problem of relative importance, I would like to conclude that the only clear-cut determiner of what MLUs will become entries seems to be length: other considerations, such as word frequency, number of definitions, extended meanings, social importance, etc., if they were considerations at all, were most surely secondary to length. In any case, when they do not have their own entry, MLUs should be marked as such for the dictionary user and cross-referenced when necessary.

The last task of this paper is to check the six-volume *Robert* (1966), to see if there is any radical difference of approach with respect to MLUs in the 'unabridged' dictionary. Perhaps what seems to be inconsistency in the *Petit Robert* is only due to considerations of space: perhaps a larger dictionary would treat *chemin de halage* in a different way. My examination of the *Robert* proved that this was not the case: for the entries I was interested in (*chemin, chemin de fer, halage, lé, marchepied*), there was no major change in the large *Robert*. In each case the definitions remained unchanged, while examples and quotations were present which had been left out of the *Petit Robert*. Thus, *chemin de halage* was not recognized as a MLU in the large *Robert*, either. One interesting detail gleaned from the larger *Robert* is that *chemin de halage* is used metaphorically in addition to its designative use: as we saw in the case of *guinea pig*, perhaps metaphorical usage is also an indication of a MLU. Thus I will end with a quote from Chateaubriand, from the *Robert* (V.3, p. 417):

L'époque où nous entrons est le chemin de halage par lequel des générations fatalement condamnées tirent l'ancien monde vers un monde inconnu.

In conclusion, this paper set out to analyze multiword lexical units and some of the difficulties which they present to lexicographers. The effort in modern dictionaries, such as the *Petit Robert*, to deal with the problems systematically (however imperfect the results may be) is one which stands to benefit greatly the dictionary user: not only will information searches be more fruitful and less time-consuming, but also the status of MLUs in the whole lexicon will be made clearer.

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SOME REMARKS ON WHY THERE IS IMPLICATURE

Georgia M. Green

"What I means and what I says is two different things," the BFG announced rather grandly. (Roald Dahl, The BFG, p. 44. New York: Farrar Straus Giroux. 1982)

Apparently it is a commonly held belief that direct communication is more effective than indirect. Why then is implicature so pervasive in natural discourse of all genres, registers, and styles? Perhaps the answer is that, conventional wisdom to the contrary, implicature is in fact quicker, safer, and more effective than "just saying exactly what you mean." This idea is compared with proposals by Brown and Levinson (1978), Katz (1981), and Sperber and Wilson (1986) which touch on some of these issues, but the following question arises: if implicature is quicker, safer, and more effective than plain, literal speech, why isn't there only implicature? The remainder of the paper is devoted to a resolution of this paradox.

Q. Readers who are addicted to reading "Dear Abby" may recall that around the end of 1986 a number of her readers got hot under the collar about such "barbaric", "violent", "inhumane" expressions as to kill two birds with one stone, and more than one way to skin a cat. Ms. Van Buren thought they had a point, and attempted to close the discussion with this observation:

DEAR CAT LOVER: Communication is at its best when one says exactly what one means in the most direct and simple way, so when stating that something can be done in more ways than one, there is no reason to drag a cat into it.

["Dear Abby", Champaign-Urbana News-Gazette, 11-19-86, p. C-2]

Apparently it is a commonly held belief that direct communication is more effective than indirect. Why then is implicature so pervasive in natural discourse of all genres, registers, and styles? One can get some feel for just how pervasive it is from the survey of texts sketched in Appendix I. The texts cited there contain an average of a little more than one implicature per hundred words of text, with implicatures comprising an average of 11% of the words in the texts, counting as implicature any intentional, non-conventional use of language with a reasonably determinable specific intended import. Thus, they include, among other kinds of examples:

1) cases of directive hints (I was hoping you'd give me a ride to implicate (abbreviated "I") 'Please give me a ride') and other manipulative maneuvers),

- 2) rhetorical maneuvers, e.g.
 - a. Rhetorical questions like Is the Pope Catholic?, and How could I give you a ride? (I) 'I couldn't give you a ride)
 - b. implied challenges like The car isn't fixed yet? (I) 'Are you sure the car isn't fixed yet?'/ 'What do you mean, "The car isn't fixed yet?";
 - c. use of factive constructions to (conventionally) implicate a presupposition, e.g. Do you realize your lights are on? (I) 'Your lights are on')
- 3) explanations, including
 - a) asserting an effect to implicate its cause (The little girl said, I will get a policeman doll. I) 'The little girl thought a policeman doll would keep vandals away from the dollhouse'),
 - b) asserting the antecedent of a mutually manifest (cf. Sperber and Wilson 1986) hypothetical to implicate (by modus ponens) its consequent (The car's not working I) 'I can't give you a ride');
 - c) similarly, by modus tollens, denying the consequent of a mutually manifest hypothetical to implicate that the antecedent is false (Fred's not old enough to get a driver's license I) 'Fred doesn't have a (validly obtained) driver's license')

Still, this survey gives a fairly conservative picture of the pervasiveness of implicature, because the count did not include two kinds of utterly pervasive implicatures:

- 1) very obvious implications of connection between two propositions, for example:
 - a) implications of temporal sequence (Claire sat down heavily at her desk. She drank the contents of her inkwell.)
 - b) implications of causality or consequence (I will rake the leaves that have fallen on Toad's lawn. He will be surprised.)
- 2) metaphors and extensions of literal meaning¹, for example, a spark of anger, to sail a report across a desk.

Returning to the question of why implicature is so pervasive, perhaps the answer is that, "Dear Abby" and conventional wisdom to the contrary, implicature is in fact quicker (because it leaves out a lot of what is intended to be understood), safer (because what is intended is not said), and more effective than "just saying exactly what you mean" (because it depends on the hearer to work out just what is intended).

1. Quicker. Obviously, if you can implicate in 5 words and half a second, what it would take 25 words and two and a half seconds to spell out or explicate, it saves time and effort to implicate it.² For example, suppose that Adele has just asked her boyfriend Bruce how she will get home if he doesn't pick her up, and he tells her to take a cab. She may, without hesitation, respond with (1a), intending this to serve as a rational, motivated rejection of his suggestion, as spelled out in (1b).

- 1a. I don't have any money.
 1b. That's no good. I can't take a cab because you have to have money to take a cab, and I don't have any money.

Of course, if reconstructing the intended implicature requires time-consuming inferencing by the addressee, as is likely in examples like those in (2), then the speaker doesn't save anything by choosing implicature over directness, except perhaps wear and tear on her vocal cords.³

- 2a. Don't they put turn signals on Chevrolets anymore? (I)...
 2a'. You have inconvenienced me by not signalling when you turned.)

[from Wilson and Sperber 1981: 165, as a response to the question, "Do you ever talk to Charles?"]

- 2b. I never talk to plagiarists. (I)...
 2b'. No, because he's a plagiarist.)

But often enough, the assumptions necessary to reconstruct the intended implicature are readily available/immediately accessible, as is presumably the case in (1).⁴ In such cases, the implicature may be evoked⁵ almost instantaneously. Conceivably, inferring the implicature (1b) from (1a) may take more effort⁶ on the part of the addressee than just understanding what is explicit in (1b), but as long as it doesn't take a noticeable amount of time, the speaker has no reason to be concerned—consciously or subconsciously, and in fact, the amount of time required to actually utter (1b) is probably several times greater than the amount of time required to infer it from (1a). Still, I think it is safe to say that sometimes people choose to implicate messages rather than explicate them because it takes less effort⁷ and less time.

Katz has speculated (1977: 20) that "pragmatics saves us from [...] wasteful verbosity" and "lengthy utterances" that would be required "if everything we wanted to express had to be spelled out explicitly in the grammar [sic] of our sentences," but I do not want to be misunderstood as subscribing to the Katzian principle of Effability, which entails that every implicature could be expressed explicitly as the literal interpretation of some sentence (Katz 1981: 226), because I don't think this is true. Sometimes an intended implicature cannot be adequately paraphrased by any amount of additional clauses and subclauses. The implicatures of the rhetorical retorts in (3) do not seem to me adequately paraphrased by any of the corresponding sentences in (4).

- 3a. Do chickens have lips?
 3b. And I'm the queen of Rumania.

- 4a. Obviously not.
 4a'. No, and you ought to have known it.

- 4b. That's a ridiculous assertion.
 4b'. That assertion is as ridiculous as the claim that I'm the queen of Rumania.
 4b". There's no more evidence for that assertion than there is for the claim that I'm the queen of Rumania.

To take a more contextualized example, in the movie Casablanca, there's a scene towards the middle where Claude Rains as police Captain Louis Renault asks Humphrey Bogart (his friend the cafe owner, Rick) if he has some stolen letters of transit which will enable a suspected Free French spy to escape from Vichy-controlled Casablanca. Rick responds with (5).

5. Louis! Are you pro-Vichy or Free French?

The Captain immediately understands this as a rebuke for asking the question, and responds, "Ha-ha! Serves me right for asking a direct question. The subject is closed." Could Rick have achieved the same effect by answering more explicitly, as in (6)?

6. You shouldn't ask me that. If I answer, it will change forever the nature of our relationship, and we won't be able to get along as we have in the past.

I think not. I think if Rick responds with anything more explicit than (7), which implicates (6) just as much as (5) does, then the damage referred to in (6) is already done.

7. You don't really want to make me answer that, do you?

So maybe there is no way to explicitly convey exactly what (5) implicates so well.

2. Safer. Regardless of whether implicature is quicker or easier than being explicit, it is often safer, as is evident from even a superficial reading of Grice (1975): since implicatures are not explicit or entailed, they are cancellable, and the speaker cannot be held responsible for committing herself to whatever a hearer infers MIGHT (or might not) have been intended to be inferred.⁸ For example, the rhetorical question in (8a) has exactly as many words as its literal gloss in (8b), and only one more syllable, so it can hardly count as being easier to utter. But being a question, it can't be literally false, so uttering (8a) is a pretty safe way to convey what (8b) expresses literally, without risking losing face by being contradicted.

8a. Who understands Joyce?

8b. No one understands Joyce.

Since the speaker hasn't made an assertion, she can't be shown to have made a false one, and accused of ignorance, deceit, or worse. (Moral: don't debate with someone who relies on such rhetorical figures.)

There are lots of other kinds of situations in which it is safer to implicate than to "speak plainly." To take an example from real life, after the University of Pittsburgh basketball team took a 12-point half-time lead over Georgetown, one of the Pitt players addressed the compliment in (9) to the Georgetown team captain, saying it "like it was over", according to the Georgetown coach.⁹

9. Nice game.

The Georgetown team took the insult to heart and won the game 65-52, but the point is that however obvious the Pitt player's insult was, it wasn't "fightin' words," because it wasn't explicit. Had the Pitt player chosen to make his insult more explicit, and less deniable, he would have been inviting a charge of being a poor sport, or even physical retaliation. As it was, the worst one can accuse him of is poor judgement.

Indeed, Brown and Levinson (1978) regard conversational implicature as a strategy of major importance in situations which constitute a serious threat to the addressee's face, and thus require extreme tact. The tactic of hinting for something desired rather than asking for it is one of the clearest examples of this. If Adele chooses (10a) over (10b) or (10c) to try to get her uncle to lend her his camera, she doesn't risk putting him on the spot if he can't or doesn't want to, and she doesn't risk being rejected and hurt if he doesn't mind saying no.

10a. I want to take pictures at the game tomorrow, but my camera's broken.

10b. Will you lend me your camera?

10c. Lend me your camera.

Adele's uncle doesn't have to choose between acceding or being an ogre or making excuses for not complying; since Adele has just made a statement, he can decline to pick up the implied hint, and address the issue of the broken camera. Maybe it can be repaired. Maybe Uncle once had a broken camera. If he doesn't pick up on the hint, Adele may infer that he doesn't want to lend her his camera, but neither has threatened the other's face, or done anything to make the other resentful.

3. More effective. Sperber and Wilson note that metaphor and other figures of speech are more effective than their literal glosses,¹⁰ saying that their "poetic effects are generally destroyed by being explicitly spelled out" (1986: 56). I think this is correct, and that their greater effectiveness is one of the reasons people use rhetorical figures to implicate, rather than speaking plainly. (Indeed) examples were cited above which showed that the explicit gloss of the content of an implicature could completely counteract the effect achieved by implicating rather than asserting that content. But to show that implicatures can be more effective than their literal glosses, it is necessary to look at cases where the gloss expresses the same content as the implicature, just not as forcefully. Example (2b) above is a case in point. Example (2b) and its gloss (2b') have exactly the same number of syllables, so (2b) isn't quicker to say, and as was suggested above, it may well take longer for A to compute.

[The speaker has just been asked, "Do you ever talk to Charles?"]

2b. I never talk to plagiarists.

2b'. No, because he's a plagiarist.

It isn't much safer, either, because although it doesn't assert, as (2b') does, that Charles is a plagiarist, other immediately available interpretations (e.g. those in (11)) are hardly less risky, and none is so readily available. Thus, in the same context, (2b) might implicate (11a) or (11b)--or, as in (11c), that for some reason, the speaker does

not want to be cooperative.

- 11a. Speaker won't answer the question because the questioner is a plagiarist.
- 11b. Speaker is changing the subject because the topic is dangerous.
- 11c. Speaker is being irrelevant because s/he is ignorant, hostile, stoned, ...

Since example (2b) is not particularly "poetic", it is not surprising that cleverer figures that make more demands on the addressee are even more effective compared to the literal representations of their intended interpretations. The examples in (12) and (13) are representative of what I have in mind--not very subtle, and not utterly original, but very effective.

- 12a. Christmas Snow is about a widow (Katherine Helmond) with two children who's going to be evicted from her home and candy store right after Christmas. Will the hard-hearted landlord (Sid Caesar) get the holiday spirit before it's too late? Did the glass slipper fit Cinderella?
 --) (Parade Magazine 12/14/86, p. 9)
- I... 12b. Of course the landlord gets the holiday spirit before it's too late; stories like this have to have a happy ending.
- 13a. The Bulls must have realized by now that they can't win many ball games if Michael Jordan has to do all the scoring. What they can do about it--the rest of the players look at double digits the way runners once looked at the four-minute-mile--is a mystery. Cheer up! By the time you read this, the Bulls will have traded their way into the playoffs. By the time you read this, Ed Meese will be writing a column for Penthouse.
 --) (Chicago Magazine 12/86, p. 81)
- I) 13b. That's wishful thinking, of course; the Bulls are no more likely to get to the playoffs than presidential pornography commission chairman Ed Meese is to write a column for the skin magazine Penthouse.

In the case of (12) and (13), the paraphrases of the intended implicatures do not make explicit anything that the utterer would have good reason to keep implicit, as was the case with examples (5), (9), and (10a), which demonstrated the content and safety aspects of implicature. So how can (12) and (13) be effective rather than uncooperatively, or even annoyingly, obscure?¹¹ Perhaps I need to say a little at this point about what I mean by "effective". I don't pretend to have a lot of statistical data that experimental subjects are more moved or persuaded by implicatures of this sort than by their plain language counterparts. And I'm not sure people have intuitions of effectiveness. But I think they do experience, in at least some situations, a feeling of satisfaction at producing implicatures appropriate to their social needs, and the "Huh! I know exactly what you mean" reaction on inferring them in understanding discourse. Why should implicatures provoke these reactions?

Maybe because within limits, a message that takes more work to process makes a deeper, more permanent impression¹², and speakers subconsciously assume this. This is, after all, the principle that underlies our (Western? American?) assumption that, within limits, people learn the hows and whys of rules and principles better by working out (and maybe experiencing) the consequences on their own than by being told what the consequences are. This is the basis for teaching geometry by having students do proofs, anatomy by having them do dissection, and linguistics by having them do analysis and argumentation. What I am suggesting is that when a person works out an implicature, by expending whatever effort is required to do that, he has a stake in the interpretation he (re)constructs being the correct one. Narcissist that he is, having worked hard on it, he is inclined to accept it. This does not mean that he believes it, of course, if it is an assertion, but it does mean that he has entertained and evaluated (at some level of consciousness) the proposition it represents and the ones that connect it to what was said, and has considered to what extent the speaker accepts those propositions. In other words, it has a much better chance of making an impression on him than a "plain language" message that he merely decodes.¹³ Probably most exploiters of implicature have never thought about why it is an effective rhetorical device, but they may take such a mechanism as this for granted nonetheless.

So maybe that's a case for saying that (within limits) implicatures SHOULD BE more effective than plain speech, because they demand more of the hearer. But is there any corroboration for this idea that deeper processing results in a greater effect? As a matter of fact, there is.

Epstein, Phillips, and Johnson (1975) (cf. also Phillips and Epstein 1979) found that when experimental subjects were asked to recall pairs of words, subjects who were instructed to focus on semantic similarities or differences did better, on recall tasks, than subjects who were told to focus on orthographic similarities, and than subjects who were simply instructed to try to learn the pairs. This superiority held both for related and unrelated pairs of words, and on delayed recall as well as immediate recall. Epstein and Phillips (1976) showed that such semantic processing facilitated recall over the other processing modes even after 5 days and 21 days.

And there is older evidence that use of metaphor has a significant persuasive effect (Bowers and Osborn 1966).¹⁴ In other persuasion experiments, subjects who drew the conclusions for themselves from stimuli which left them implicit were more persuaded thereby (Katz, Barnoff, and McClintock 1956).

Thus there is experimental evidence that the more one thinks about the meaning of what is said, the deeper and more long lasting the impression it makes. It follows that implicatures should be more persuasive in communicating what was intended (when they are worked out as intended) than their plain language counterparts, precisely BECAUSE they require more effort to work out.¹⁵

The idea that implicature should be more effective than plain speech, because it demands more work by the hearer is contrary to what

Sperber and Wilson's account predicts. Sperber and Wilson assert (1986:218) that "a speaker aiming at optimal relevance will leave implicit everything that her addressee can be trusted to supply with less effort than would be needed to process an implicit prompt." This follows from the definition of optimally relevant, which amounts to 'generating the largest number of contextual effects in the addressee while requiring the least processing effort by the addressee' (1986:153, 158). But it implies that implicatures would have to be either very obvious, or very pregnant with meaning to even be candidates for being reconstructed correctly, and that speakers and addressees should judge implicatures like (12) and (13) to be more trouble than they are worth.

On my account, part of what makes implicature (and figurative language of all sorts) effective is the extra processing effort it demands. But this extra processing effort should make it (relatively) irrelevant for Sperber and Wilson; since understanding (12a) and (13a) as intended requires a significant amount of inferencing, while the explicit counterparts in (12b) and (13b) are not so much longer that they would seem to require a substantial processing effort, utterances like (12b) and (13b) ought to be preferred to (12a) and (13a) by an optimally relevant speaker, according to the Sperber and Wilson account. Furthermore, discourses like (12a) and (13a) ought to be incomprehensible to the addressee, given the availability (to the speaker) of (12b) and (13b). I doubt that either is the case, though it is not clear that 'optimal relevance' and 'speaker aiming at optimal relevance' are empirically vulnerable notions.

4. Why is there literal speech? If implicature is quicker, safer, and more effective than plain, literal speech, why isn't there only implicature? Since it is obvious that people do find uses for "plain, literal" speech, I will discuss three reasons why this is not an anomaly for the explanation proposed here. These are, of course, above and beyond the obvious point that some sense of literal meaning or normal use is necessary to calculate implicatures from.

First of all, so-called literal, explicit speech is considerably less literal and more figurative than unreflecting judgments would estimate, as Nunberg (1978) has suggested, as I have described elsewhere at some length (Green In press), and as Sperber and Wilson indicate at several points (1986:193, 230-237).¹⁶ In the unremarkable, prosaic sentence in (14), at least three referring expressions are not intended or understood in their most (likely) literal senses.

14. This newspaper claims that the president bombed the hamlet because North Vietnam would not come to terms.

Newspaper refers to a reporter or an editorial staff, not a paper and ink product; bombed refers to an authorization to bomb, not the actual losing of explosive material; and North Vietnam does not refer to a geographic or political entity, but to the authorized representative of one. Perhaps as much as 20% of the content words in a narrative are extended, metaphorical or metonymic uses that are not listed in dictionaries¹⁷, but are related to senses that are, by one or more regularly recurring referring functions (Nunberg 1978:29ff). Implicature is involved in the determination of reference here in that

the assumption that the speaker is saying something relevant is necessary to enable the hearer to infer what is being said "literally".

Second, sometimes it is more effective to be more explicit BECAUSE it takes longer--the same reason that, in other circumstances, it is more effective to implicate than to be explicit. Here the speaker guarantees that the addressee will focus attention on complex relationships involving the subject at hand by elaborating them and thereby extending the discussion. By being explicit, the speaker guarantees that the addressee will know what conclusions the speaker intends to be drawn. As teachers, one of the first things we learn is that the crisp, tight prose we learned to write for our peers and our teachers is totally inappropriate for lecturing to our students, because in a lecture situation, students don't have enough control over the flow of content to ensure that they have time to interpret and absorb what is being said, the way they would in informal conversation or in reading a book.

Third, although I have indicated circumstances when it is safer to implicate than to be explicit, in other circumstances implicating may be riskier, not safer, than being explicit. A speaker who cannot confidently estimate how many of his assumptions his audience shares, and assumes he assumes they share, risks producing discourse that will be misinterpreted, or even disregarded as too much trouble to interpret. All of us surely have read papers where it just didn't seem worth the effort to try to figure out why some respected colleague was making such apparently false (or unwarranted, or absurd) claims, or what some writer assumed the connections were among the propositions which got represented explicitly. (Morals: if you need to make sure someone sees things as you see them, spell it out. This is Rule One of didactic exposition.)

Implicating can be socially risky as well, and for the same reason. While ambiguity is what makes implicature safe--giving the implicator as well as the addressee a reading to hide behind, it is also what makes it risky in other circumstances, when the implicator cannot confidently calculate which interpretation will be inferred. For example, suppose that Adele, who wanted to borrow her uncle's camera, was not worried about putting her uncle on the spot, but instead was very concerned to let him know she needed a camera. She would be foolish to use an implicature like (10a) (My camera's broken), for the very reason that it was useful in the other situation: if the uncle interprets her saying, "My camera's broken" as just an observation, and fails to infer that Adele wants him to lend her his camera, she's wasted an opportunity.¹⁸

Finally, a person who never spoke explicitly and "said what he meant", but only implicated it, would make a rather uncongenial conversational partner. Imagine trying to carry on a serious conversation with someone like Kit in the hypothetical dialogue in (15).

- 15a. Chris: Are you going to Kim's party?
 15b. Kit: Is the Pope Catholic?
 15c. Chris: Who are you going to take?
 15d. Kit: Lou said Sandy was going to be in town.
 15e. Chris: Do you think Lou would mind if I brought Dana?
 15f. Kit: Who cares what Lou thinks.

15g. Chris: Did you see this morning's paper--Iran is calling for their people to overthrow the Saudi royal family.

15h. Kit: And they laughed when the Ayatollah sat down to play the piano.

A person who spoke only in implicatures would come across as cold, suspicious, cynical, and whatever else you would call someone who meticulously avoided committing himself to a position.

5. Having your cake and eating it too. There is another paradox (a double paradox, in fact) that deserves to be addressed. On the one hand, as mentioned above, implicature is a valuable politeness strategy in situations where it is important not to impose on, or make demands of the addressee. Yet I have claimed that implicature is effective BECAUSE it makes demands on the hearer. On the other hand, because use of implicature presumes that speaker and addressee share a lot of assumptions and values, including the assumption that the addressee will be willing to do a little work to figure out what the speaker wants to convey, implicature is also a useful social interaction tactic in more intimate situations where it is important to display friendliness, trust and shared values (cf. Lakoff 1973 and Brown and Levinson 1978:106-134). Implicature imposes processing demands on the addressee; how can it be a politeness strategy in situations where making demands is inconsiderate, and at the same time be a politeness strategy in other situations BECAUSE it makes demands on the addressee? The answer is that in situations where it is important to avoid imposing on the addressee, speakers seem to treat the processing demands of a polite implicating speech act as insignificant compared to the social impositions that being direct entails; making a direct request puts the addressee on the spot while hinting does not (because its vagueness makes the intended inference only one of the plausible inferences that would be rational in that context). But an implicature like (15h) can be a positive politeness tactic (Brown and Levinson 1978:106-134) among intimates, because it saves time and promotes solidarity, implying, 'we share so much and you are so knowledgeable and alert that you can tell what I mean even if I only allude to it obliquely'. Such implicatures are polite BECAUSE 1) to the extent that they make a processing demand, they trade on it, conveying, 'among close friends, a little processing demand is insignificant', and 2) to the extent that the speaker and addressee do know each other well, such implicatures don't make as much of an inferential demand as they would if addressed to a stranger or a mere acquaintance. Implicatures like (15h) would be inconsiderate addressed to a stranger.

This paradox of implicature--that it can be at the same time ineffably suited to particular conversational purposes, and singularly unsuitable as a general conversational strategy--has parallels in certain of Darwin's arguments for natural selection. Gould (1985) points out that Darwin concentrates not on the "beautiful, optimally designed adaptations of organisms to their environments" (1985:42), since good design is what should be expected from any evolutionary theory. Rather, he focusses on the anomalies that are only attributable to selection based on reproductive success--the crux of natural selection. Gould points out that the most striking of these are "those structures and habits that plainly compromise the good design of organisms (and the ultimate success of species) but just as clearly increase the

reproductive prowess of individuals bearing them"--e.g. the tail feathers of peacocks and the immense antlers of the extinct Irish elk. Implicature is logically an unnecessary excrescence given the sine qua non of a communicative system: a finite recursive syntax and a compositional semantics. And in the long run, we could surely get along without it. But in the short run, how could we give up a tool so useful in our daily struggles for conversational success?

Appendix I

As indicated in Table I, samples (averaging 670 words each) were taken from three genres of discourse: children's literature (specifically, picture books intended for the very young), expository prose (an article from Newsweek and a two-page spread from a linguistics monograph on grammatical theory), and natural speech (excerpts from five narratives in Terkel (1972) and one telephone conversation). The texts were not selected completely at random, of course, and they may not constitute a representative sample of English-language discourse. However, texts of all genres can undoubtedly be found with much lower (and much higher) incidence of implicatures of the sort counted. More importantly, none of the texts is remarkable on account of its implicatures; examining them in another context, the reader would not be likely to notice any of the implicatures.

The number of implicatures per 100 words ranged from .6 to 2.2; the percent of text that invited implicature ranged from 7.5 to 19.

TEXT (length in words)	IMPLICATURES	WORDS	PER 100 WORDS	% OF TEXT
<u>Are You My Mother</u> (699)	12	133	1.72	19
"Down the Hill" (363)	8	59	2.2	16
<u>Two Bad Mice</u> (972)	10	110	1.03	11
<u>Grammatical Theory</u> (674)	5	126	.74	19
Waiting for Muammar (961)	9	96	.94	10
telephone convers. (1293)	14	100	1.03	7.7
<u>Working</u> pp. 168-169 (766)	6	59	.78	7.6
<u>Working</u> pp. 258-259 (834)	5	63	.60	7.5
<u>Working</u> pp. 682-683 (808)	9	98	1.11	12

Table I: Selected implicatures in discourse

The sampling below of implicatures from the texts analyzed should provide a sense of just how ordinary the sorts of implicatures I enumerated are; the ones in these texts are not especially clever or witty, but represent a commonly chosen option in natural, unaffected discourse.

From Beatrix Potter's Tale of Two Bad Mice:

The little girl that the doll-house belonged to, said,--"I will

get a doll dressed like a policeman."

I) The little girl thought a policeman doll could keep vandals out.

But the nurse said,--"I will get a mouse-trap!"

I) The nurse knew the vandals were mice, and that a doll wouldn't deter them.

From a conversation:

C: The car's not running.

K: The car's not running?

I) Are you sure the car's not running?

From P.D. Eastman's Are You My Mother?:

[to a baby bird] I'm not your mother. I'm a dog.

I) I couldn't be your mother because I'm a dog and you're a bird and a dog can't be a bird's mother.

From Studs Terkel's Working (Janitor):

They talk about heart attacks shoveling snow. In one of my buildings alone, I almost had a block of snow to shovel--plus the entrances, plus back porches.

I) I have a lot of snow to shovel.

From a Newsweek article about Khaddafi:

Despite 17 years of a revolutionary regime, Libya remains in many ways a traditional Islamic country; Kaddafi's liberalization of divorce laws and draft of women into the Army passed earlier this year in the face of unprecedented opposition from the regime's building blocks, the People's Congresses.

I) The fact that revolutionary moves were bitterly opposed is evidence that Libya remains a traditional Islamic country.

Appendix II

Table II below indicates the average percent of Nouns, Verbs, and Adjectives in nine arbitrarily selected 200-word passages of modern British and American fiction used in senses not listed in large desk dictionaries.

Text number	Percent of N, V, A whose senses were not listed
1	29
2 (Tom Robbins)	17
3 (Saul Bellow)	8
4	9
5	15
6	17
7	8
8 (Tolkien)	9
9 (Henry James)	24

Table II: Content words used in unlisted senses in selected texts

NOTES

¹For arguments that these represent implicature, cf. Grice 1975, Nunberg 1978, Green 1984, Green in press.

²Cf. Horn's (1984) Q-Principle: Say as much as you can.

³And her brain, if it takes more effort to (decide to) use an implicature than to use a corresponding explicit utterance. Because of all the (unconscious) decisions that are involved in planning ANY utterance (cf. Green 1982), it's not at all obvious that it necessarily would. In any case, it's an empirical question.

Ladislav Zgusta (p.c.) points out that (2b) is also more informative than (2b'), in that it implicates that the reason for not talking to Charles is the speaker's (stated) policy of never talking to (any) plagiarists. But (2b') implicates the existence and the consequence of such a policy as well, so it seems valid to ignore this in comparing what the two utterances would be intended to convey. Each asserts a different one of the two premises (Charles is a plagiarist; I never talk to plagiarists) in the syllogistic answer, and requires the other to be inferred; (2b) also requires the conclusion to be inferred.

⁴Levinson (1985:4) notes that "appropriate responses to prior utterances and their associated implicatures are often produced with less time lapse in speaker-transition than is required to produce a vowel" --under 200 milliseconds.

⁵By using this term I mean to imply that the reasoning involved in reconstructing implicatures is not conscious, though it may well involve deductive logic of a familiar sort (cf. Sperber and Wilson 1986: 93-103).

6It is hard to see how one could measure this, and compare the amount of work involved in decoding, disambiguating, and inferring senses and references necessary to understand (1b) "literally" to the amount of work involved in inferring (1b) from (1a) in context, although Sperber and Wilson (1986: 218) assume that such comparisons are sensible:

A speaker aiming at optimal relevance will leave implicit everything her hearer can be trusted to supply with less effort than would be needed to process an explicit prompt.

7I am referring here to the physical effort involved in the mechanical aspects of producing an utterance (movements of the diaphragm, pharynx, mandible, velum, tongue, lips, vocal cords, etc. (or hand(s) and arm(s)).

8Sperber and Wilson (1986:56) suppose that it is obvious "that what is implicitly conveyed by an utterance is generally much vaguer than what is explicitly expressed," but it seems to me that neither the intended implication nor the implication inferred is vague. Rather, what is SAID only vaguely suggests what is intended to be inferred, and strictly speaking, probably doesn't even determine a finite number of implicatures. Sperber and Wilson go on to say that "when the implicit import of an utterance is explicitly spelled out, it tends to be distorted by the elimination of this often intentional vagueness," (1986:56). Perhaps this is too nice a distinction, but it may be that the distortion comes less from "eliminating vagueness" as a general property, and more from speaking the unspeakable--propositions or expressions which offend or insult or entail some face-threatening act.

9Champaign-Urbana News-Gazette, Feb. 19, 1987, p. B-3, from the Associated Press.

10This seems to contradict Sperber and Wilson's claim a few pages later (1986: 60) that implicit communication (e.g. implicature) is generally weakly communicated, apparently because what is said is vague (and this is why implicating may be safer). Of course, what is said is not the same as what is implicated (or it wouldn't be implicated--it would be said), so it may happen in context that something very specific is readily inferred (and understood to be intended to be inferred) with reasonable certainty from some fairly vague utterance, and such an implicature will constitute communication essentially as strong as what is intended by some more literally meant precise and explicit utterance.

11Of course, (13) might be annoyingly obscure to someone who didn't know, and couldn't guess, that Meese was strongly associated with positions advocating censorship and a very broad definition of pornography, and that Penthouse is considered a soft-core pornographic magazine.

12I realize that these claims bear a certain resemblance to advertising slogans, but I think these are exactly the right words.

13Of course, "merely decoding" an utterance, arriving at a representation of its intended sense and reference is no small feat, and

involves implicature too (cf. Nunberg 1978, Green In press (Chs. 3 and 5) for some explication of exactly what is involved). The point is that the processing involved in interpreting an utterance as inviting a particular implicature is all in addition to what is required for decoding it.

¹⁴McGuire (1969:208) notes that "Aristotle and Cicero suggested that metaphor would add to persuasive impact by increasing the perceived intelligence of the speaker" and that "Quintilian suggested that metaphor would add to persuasive impact by entertaining and pleasing the audience." Obviously, I agree with their conclusion that metaphor should be effective, though not with their assumptions about what makes it effective.

¹⁵Green (1980: 598) speculates that the effectiveness of one use of non-canonical, inverted syntax arises from its requiring non-automatic processing.

¹⁶Sperber and Wilson do not take as extreme a position here as Nunberg does (cf. 1986:175).

¹⁷As evidence for the pervasiveness and creativity of extended uses, a survey of nine arbitrarily chosen 200-word passages from works of modern British and American fiction revealed that an average of around 15% of the nouns, verbs, and adjectives in them were used in senses that are not covered by the entries in a large desk dictionary. (The range was 7% to 29%. See appendix 2.)

¹⁸In fact, she has also made it awkward to try again right away, because that would risk drawing the uncle's attention to this misfire, and his part in it, and generally increase the social tension in this somewhat face-threatening situation.

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SHANGHAI TONES: A NONLINEAR ANALYSIS *

Zhiji Lu

This article presents a detailed analysis of Shanghai tones within the framework of current phonological theories, especially the recent development of lexical phonology and theory of underspecification. I show that only two level tones /H/ and /L/ are necessary in the underlying forms of Shanghai tones and all the surface forms for both citation form and sandhi form are derived by a set of phonological rules, which include the default rules supplied by Universal Grammar (UG) and some other language-specific rules. On the basis of the analysis, I discuss some related issues such as the role of segmental information for tonal derivation, the tonal typology of Chinese dialects, the asymmetry of the tonal features and the feature underspecification. Finally, in the light of this study, I argue that tone features are coplanar and only the coplanar model is proved optimally adequate for tonal representation.

1. BACKGROUND

1.1 Data

The tonal phenomena studied here refer to the standard speech of metropolitan Shanghai which belongs to the Wu Dialects spoken in eastern China, one of the seven major dialect groups of Chinese. In traditional analysis, there are five tone classes assigned to the monosyllabic morpheme or word in citation form. The phonetic values of these five tone classes are as follows: (M' represents the raised mid tone)

(1) Tone	A: HL	Examples:	sǎ HL (wound); foŋ HL (wind)
	B: MM'		tɕin MM' (enter); ɕiɔ MM' (small)
	C: LM'		zu LM' (sit); fiɛ LM' (salt)
	D: M'		həʔ M' (black); t'əʔ (put off)
	E: LM		zəʔ LM (thief); fiɔʔ (fall)

Tone sandhi occurs when these monosyllabic morphemes or words with different tones in citation form are combined into disyllabic or polysyllabic words or compounds. For example:

(2)	HL + HL	→	H ML
	sǎ foŋ		sǎ foŋ
	(wound) (wind)		(catch cold)

Based on my phonetic experiment (Lu 1986), the phonetic values of the disyllabic, trisyllabic and four-syllabic words or compounds from the different

combinations of these five tones are given below (Xs represent the tones of the syllables after the leftmost syllable):

(3)	2-syl	3-syl	4-syl
AX(XX):	H-ML	H-M-ML	H-M-M-ML
BX(XX):	M-M'	M-H-ML	M-H-M-ML
CX(XX):	L-M'	L-H-ML	L-H-M-ML
DX(XX):	M-M'	M-H-ML	M-H-M-ML
EX(XX):	L-LM	L-L-LM	L-L-L-LM

In Shanghai dialect, stress always appears on the initial (or leftmost) syllable of the word or compound.

1.2 Tones and the segmental properties

There exist close relationships between the tone class and the properties of the segmental sequence within the tone-bearing syllable in Shanghai. Traditionally, Chinese syllable structure is described in terms of tones, initials, medials, nuclei, and endings. Thus, the segmental sequence in the syllable of Shanghai may contain the consonant initial, the medial (glide), main vowel or nuclei, and the consonant ending. The internal constituency of syllable structure is illustrated below:



The crucial points here are the properties of consonants in the initial and final positions. There are 33 initial consonants in surface form in Shanghai (Xu et al. 1981). They can be divided into two groups: Group A consists of voiceless stops, affricates, fricatives, and nasals/laterals with a preceding voiceless glottal stop; and group B contains voiced stops, affricates, fricatives, and nasals/laterals with a preceding voiced glottal fricatives. The feature [+murmur] is used to mark the initials of Group B, as in several previous studies of the Shanghai tones, and the initials of Group A are left as unmarked ones.

There exist three consonants as the endings for the closed syllables: [n], [ŋ], and glottal stop [ʔ].

The relations between the tone classes and the groups of the initials and the endings are as follows: (a) Tones A, B and D only occur in the syllables with the initials of group A; while tones C and E are only with the initials of group B. (b) Tones A, B and C are only related to the syllables without a glottal ending, and tones D and E only occur in the syllables containing a glottal ending. They can be shown below:

(5)	Tone	C	G	V	C
	A	---			---
	B	---			---
	C	[+mur]			---
	D	---			[+glottal]
	E	[+mur]			[+glottal]

Having a glottal ending, tones D and E are short in duration. They are called Entering tones in traditional Chinese phonology.

1.3 Previous studies

Sherard (1972) first claims that the contour of polysyllabic words depends on the tone of the initial syllable. Ballard (1977) states that "in Shanghai apparently the only sandhi that occurs is of the type I shall call 'right spreading'" (p.12). This claim was modified by Zee and Maddieson (1979, henceforth Z & M) who, based on the results of their phonetic experiment, suggested that two major processes are involved, "the spreading of the tone(s) of the first syllable of a compound to the second syllable, and the replacement of the tone(s) on third and subsequent syllables by Low tone" (p.127). In Z & M (1979), an autosegmental analysis was first given to the Shanghai tonal phenomena, and four underlying forms were proposed:

(6)	Tone	A:	/HL/
		B:	/MH/
		C, E:	/LH/
		D:	/H/

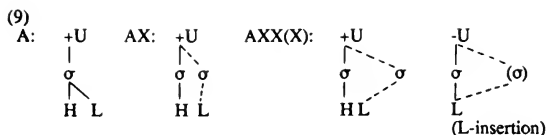
A reanalysis is presented in Yip (1980). Yip proposes for tone a hierarchical feature system in which two binary features together define four tonal levels: one is the Register feature [upper] which splits the overall pitch range into two registers; the second feature is Tone [high] which divides each register into two sub-registers. She claims that each of these features is potentially an independent autosegmental tier, and "only the feature Tone may occur in sequences underlyingly", while registers do not occur in sequence: "Register remains constant over the syllable" (p.196). Thus the tonal representation looks like the following:

(7)	[+Upper]	or (for brevity):	[+Upper]
			/
	σ		L H
	/		
	L H		

Under her Register system, she reduces the tone inventory of Shanghai into three tones:

(8)	Tone	A:	[+Upper, HL]
		B, D:	[+Upper, L]
		C, E:	[-Upper, LH]

For the compounds, she assumes that the syllables after the first one are toneless, thus abandoning the mechanisms of tone deletion as Z & M did. The following is an example of her analysis (p.208):



For the same data, Wright (1983) provides metrical analysis with the notion of the moraic timing device. She proposes that syllables in strong or isolated positions have two moras while syllables in weak positions have only one mora, and mora is assumed as tone bearing unit instead of syllable as tone bearing unit. Thus, under her approach of the timing device, two Entering tones of Shanghai, tones D and E, have one mora, and the weakly stressed syllables within the trisyllabic and four-syllabic sandhi forms are all reduced to a single mora. I do not enter into the details of her analysis here since, in my view, the analysis of Shanghai tones can be carried out without this special timing device.

2. THE ANALYSIS

2.1 The theoretical assumptions

I assume the major theoretical claims made in the current development of lexical phonology (Mohananan 1982, Kiparsky 1982, Pulleyblank 1986 and others).

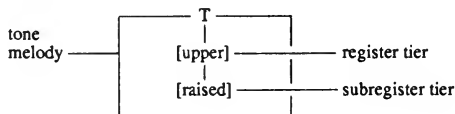
The tonal feature system used here is taken from Yip (1980) and Clements (1981). Four basic pitch levels are shown in (10) below under this hierarchical system (see Pulleyblank (1986)):

(10)

Register	Subregister	
+upper	+raised	H
	-raised	M'
-upper	+raised	M
	-raised	L

For the tonal representations, following Archangeli (1985) for analysis of vowel features, I propose a coplanar model in which the tonal melody is formed by a single plane with internal organization of two feature tiers: the register tier which anchors on the tone-bearing unit (T), and the subregister tier which anchors on the register tier, as illustrated below:

(11) Coplanar model



Thus, the full specifications of the four basic level tones under this model are given below: (henceforth [U] for [upper] and [R] for [raised])

(12)	T	T	T	T
	[+U]	[+U]	[-U]	[-U]
	[+R]	[-R]	[+R]	[-R]
	H	M'	M	L

I also assume that the associations between the feature matrices (or melody units) and their anchors follow the Association Conventions which map a sequence of free (or floating) melody units onto a sequence of anchors from left to right. Of course, associations either by the Association Conventions or by rule cannot violate the Well-Formedness Condition (i.e. association lines cannot cross).

2.2 Underlying forms, rules and derivations

Let us turn to the data. The surface forms of the monosyllabic words of the five different tone classes and disyllabic words or compounds with the combinations of these five tones are given as follows with the full feature specification on the register tier:

(13)		AX:	σ	σ
A:	$\begin{array}{c} \sigma \\ \diagup \quad \diagdown \\ [+U] [-U] \\ [H \quad L] \end{array}$			
			[+U]	[-U]
			[H	ML]
B:	$\begin{array}{c} \sigma \\ \diagup \quad \diagdown \\ [-U] [+U] \\ [M \quad M'] \end{array}$	BX:	σ	σ
			[-U]	[+U]
			[M	M']
C:	$\begin{array}{c} \sigma \\ \diagup \quad \diagdown \\ [-U] [+U] \\ [L \quad M'] \end{array}$	CX:	σ	σ
			[-U]	[+U]
			[L	M']
D:	$\begin{array}{c} \sigma \\ \\ [+U] \\ [M'] \end{array}$	DX:	σ	σ
			[-U]	[+U]
			[M	M']
E:	$\begin{array}{c} \sigma \\ \\ [-U] \\ [L \quad M] \end{array}$	EX:	σ	σ
			[-U]	[-U]
			[L	LM]

It is easy to see that within the domain of a word (or compound), either monosyllabic or disyllabic, on the register tier, only those with tone A as the accented or

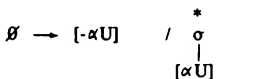
leftmost syllable begin with [+U] while the others all have [-U] at the beginning position except a monosyllabic word of tone D which is specified as [+U]. However, the disyllabic word with tone D as the first syllable also begins with [-U], and tone D, as mentioned above, is associated only with a syllable of short duration ending in a glottal consonant. Therefore, we have reason to assume that for a monosyllabic word of tone D there still exists contour tone beginning [-U] in the early stage of the derivation and that this [-U] is delinked during the derivation caused by contour simplification on short syllables. In the light of this observation, I propose that there are only two level tones for the underlying representation in Shanghai, namely /H/ and /L/. /H/ is the underlying form for tone A while /L/ is the underlying form for tones B, C, D, E. Of course, the H is lexically specified as [+U] and the L is lexically [-U]. With the theory of underspecification proposed in Kiparsky (1982), Archangeli (1984), Pulleyblank (1986) and Sohn (1987), I assume that only the H is specified as [+U] and the L is left underspecified. The specification of [-U] for the register tier in the unmarked case can be provided by the following default rule:¹

(14) Default [-U]-insertion:



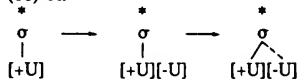
Now, let us first deal with monosyllabic or disyllabic words related to tones A, B, C, D as the accented or leftmost syllable, and leave those of tone E for a while. The contours can be observed on the register tier for these words. I assume that they are directly derived by the following Contour Formation rule:

(15) Contour Formation



Take a monosyllabic word of tone A as an example. The underlying form of tone A is /H/ as proposed above. /H/ is specified as [+U] lexically. The contour on the register tier of the syllable is directly generated by applying the Contour Formation rule (15). Contour Formation inserts [-U] immediately after [+U], and then this floating [-U] is linked to the tone-bearing unit by the Association Conventions, as follows:

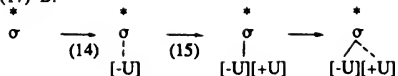
(16) A:



/H/

Consider those with /L/ as the underlying form. Take a monosyllabic word of tone B as an example. The underlying form of tone B is /L/ as proposed above. Since /L/ is left underspecified, the default rule (14) provides the specification of [-U] on the register tier. Then the Contour Formation rule (15) gives the word a contour tone, as illustrated below:

(17) B:

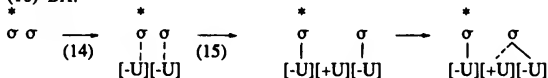


/L/

Obviously, the Default [-U]-insertion rule should be applied at the beginning of the lexical cycle if no marked underlying form of the accented syllable occurs. Then, the Contour Formation rule, as a language-specific rule, is applied to form the contour tones.

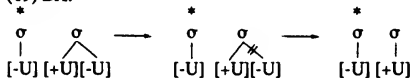
For disyllabic or polysyllabic words or compounds in Shanghai, I assume that only the accented or first syllables (or morphemes) within the domain of these words keep their inherent tones while the unaccented syllables are toneless in the underlying representation. Of course, the unspecified tone-bearing units will be specified by the default rule (14). Here, I show the derivation of BX as an example:

(18) BX:



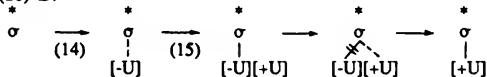
The output does not exactly match what is shown in (13) since the second syllable is linked with both [+U] and [-U]. Observing the data carefully, we can find that there is no contour, on the register tier, linked to a syllable if the syllable is unaccented or if it has a glottal ending. I propose a general constraint rule of this dialect: i.e. the Contour Simplification rule on the register tier, which delinks an already linked [U] from the tone-bearing unit when another floating [U] links to it by the Association Conventions. Now, the output of BX in this stage will be:

(19) BX:



This Contour Simplification rule on the register tier also helps to derive the correct form displayed in (13) for monosyllabic words of tone D which have a glottal ending:

(20) D:



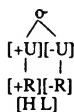
Now, let us consider the monosyllabic words of tone E or the disyllabic words with tone E as the leftmost syllable. There is no contour on the register tier for them. If the Contour Formation rule applies to them, we cannot get the correct output as in (13) even by using the Contour Simplification rule. Therefore, our only recourse is to modify the Contour Formation rule (14) by adding the condition that it cannot apply to a syllable having both murmured initial consonant and glottal final consonant. Thus, the Contour

Formation rule becomes a syllable-sensitive rule which only applies to the accented syllable of tones A, B, C and D.

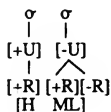
We are now ready to deal with feature specifications on subregister tier. I assume that all feature specifications on the subregister tier can be predicted or derived by rule. The following is the surface representation fully specified in both register and subregister tiers for monosyllabic and disyllabic words:

(21)

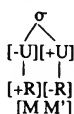
A:



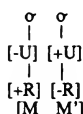
AX:



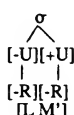
B:



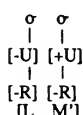
BX:



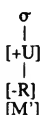
C:



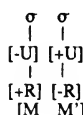
CX:



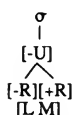
D:



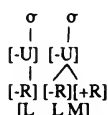
DX:



E:

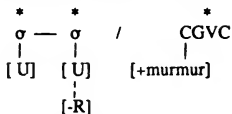


EX:



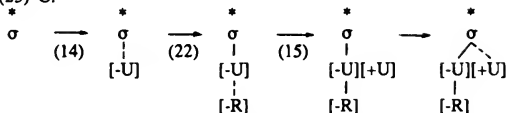
It can be observed that accented or leftmost syllables are specified with [-R] in the beginning position only if they have murmured initial consonants (i. e. those of tones C and E). We can explain it on phonetic grounds that the voiced consonant at the beginning of the syllable may lower the tone pitch. Thus a Lowering rule is formulated to capture this fact:

(22) Lowering (syllable-sensitive)



Take a monosyllabic word of tone C as an example:

(23) C:



The Lowering rule is applied before the Contour Formation rule.

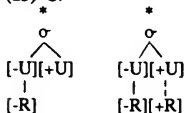
Up to this stage, the second position on the subregister tier associated with the [+U] is still unspecified. I propose another default rule to fill in this position with a [+R] by the end of lexical cycle. This default rule is formulated as follows:

(24) Default [+R]-insertion:



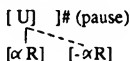
By applying this default rule (24), the output of (23) will be:

(25) C:



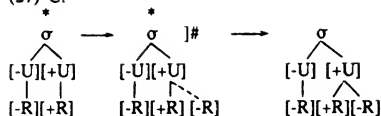
Obviously, this is not the desirable result -- cf. (21). It is observed from (21) that words with tones A, B, C, D as the accented or leftmost syllable all end with [-R] on the subregister tier. This is exactly the opposite value of what is shown in (25). Thus, I propose a post-lexical rule named [R]-attachment rule to derive the correct form:

(26) [R]-Attachment



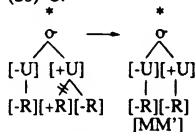
Now, [-R] will be attached to the right edge of the output of (25) by the [R]-attachment rule on the post lexical cycle:

(27) C:



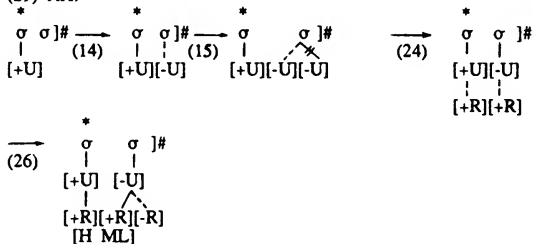
It can be observed that no anchor on the subregister tier specified with [+U] is associated with a contour. Thus there exists another constraint rule for contour simplification on the subregister tier which delinks the already linked [R] from [+U] when another floating [R] attaches to it. Now, the output of (27) will be:

(28) C:

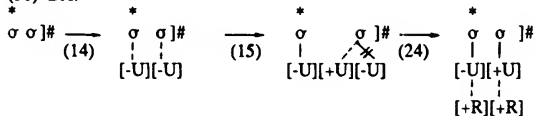


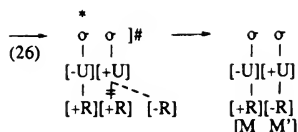
This is precisely the result we need. Take disyllabic words with tone A or tone B as the leftmost syllable as further examples. The whole derivations can be illustrated as follows:

(29) AX:

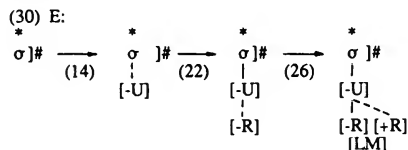


(30) BX:

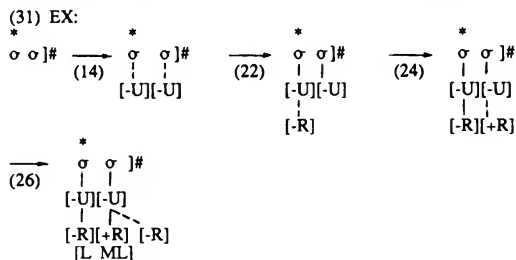




Now, consider the derivation of words an accented syllable of tone E. The monosyllabic word of tone E is derived by the same set of rules mentioned above:



But there is problem for disyllabic words with tone E as the leftmost syllable:



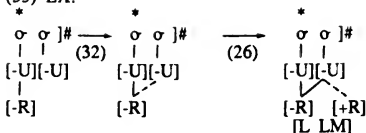
This is not the correct result. The problem is caused by the application of the default [+R]-insertion rule which assigns [+R] to the unmarked position associated with the second [-U]. If this position is filled with [-R] before applying this default rule, this problem can be avoided. Thus, a rule named [-R]-spreading is proposed to solve this problem:

(32) [-R]-Spreading



This is a lexical rule. The application of this rule is ordered before the default [+R]-insertion rule. Now, the derivation of EX after the application of the Lowering rule will be:

(33) EX:



To summarize, only two underlying tones are proposed here for Shanghai, namely /H/ and /L/: the H is assumed for tone class A which is lexically specified with [+U], while the L is assumed for tone classes B, C, D and E which are left lexically unspecified. In polysyllabic words or compounds, only the accented or leftmost syllable will keep its inherent tone; others will be toneless. In all cases, the surface forms can be derived by the default rules ([-U]-insertion rule and [+R]-insertion rule) and a set of language-specific rules. The set of language-specific rules contain the lexical rules, the post-lexical rule and constraint rules:

(34) Lexical rules (ordered as follows):

- a. Lowering rule
- b. Contour Formation rule
- c. [-R]-spreading rule

The Lowering rule and the Contour Formation rule are syllable-sensitive rules: the former is applied for syllables with a murmured initial consonant while the latter is not applied for syllables having both a murmured initial consonant and a glottal final consonant.

The post-lexical rule is:

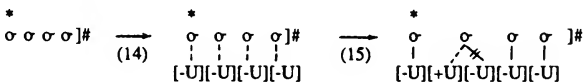
(35) [R]-attachment rule

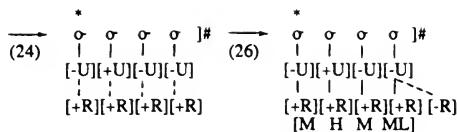
The post-lexical rule is only involved with feature specification in the subregister tier.

The constraint rules (i.e. Contour Simplification rules) that disallow the linking of a contour on the register tier to an unaccented or short syllable, and also disallow the linking of a contour on the subregister tier to a single [+U].

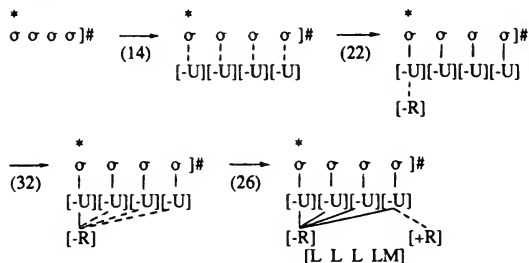
With the above sets of rules, the surface forms of words or compounds of more than two syllables can also be derived. To save space, only the derivations of BXXX and EXXX are shown below:

(36) BXXX:





(37) EXXX:



3. Discussion

3.1 Tonal typology

3.1.1 Segmental information

Compared with the tonal phenomena in African languages, those in Chinese seem more complex with regard to the tone inventory. In African languages, two-tone systems are very common, and most of languages have less than four level tones. But, in Chinese, the number of tones in surface form may go up to nine or ten (as in Cantonese). In the Wu Dialects, the number of tones in citation form are from five to eight. However, as shown in section 2, with the principle allowing only unpredictable properties underlyingly, I have reduced the tone inventory of Shanghai to only two tones in underlying representation. Obviously, the segmental information plays an important role in tonal derivation.

Concerning the historical development of Chinese, it is assumed that Chinese has undergone the shift from some segmental distinctions to tonal distinctions. In Ancient Chinese (around 600 A.D.), it is generally held that there were four tone categories. Conditioned mainly by the contrast of voiceless and voiced initial consonants, tonal splits occurred. Some dialects, which have eight tones in citation form (e.g. Wenzhou dialect, a subdialect of the Wu dialects), neatly reflect such splitting. Thus, tone properties to a large extent are related to the properties of segments within the syllable. Of course, some dialects, especially in Mandarin groups, have already finished this shifting process and lost the contrast on the segmental plane regarding the tonal contrast by the processes of simplification of sound systems. For instance, in Mandarin, there are two tone categories in the "Even Tone": Yin Ping (Yin Even Tone) and Yang Ping (Yang Even Tone). The former is originated from the syllables of the Even Tone with the voiceless initial

consonants in Ancient Chinese while the latter from the syllables of the Even Tone with voiced initial consonants, though the voiced initial consonants have already disappeared now. In contrast with Mandarin, many dialects in southern and eastern China are still in the late stage of this shifting process, keeping in different degrees of the distinction at both levels: tone plane and segmental plane. In my view, Shanghai is among them. This makes it possible to reduce the tone inventory of these dialects by efficiently using the segmental information. Thus, only two level tones /H/ and /L/ are proposed for the underlying representations of Shanghai tones, and the application of the lexical rules, to derive the surface forms, in most cases, uses the segmental information.

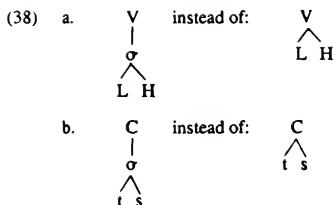
3.12 From the syllable-based tone melody to the word-based tone melody

In traditional analyses of Chinese tonal phenomena, the tones in citation form are regarded as basic form and the tones in sandhi form are considered as changed or derived form. Therefore, the tonal analysis always breaks into two stages: first, to determine the tones in citation form, and then, to derive the sandhi form from the citation form. My analysis here is different from the traditional analyses as well as most of previous studies in Western Literature, since I assume that the derivation of tones either in citation form or in sandhi form shares the same phonological processes.

Wright (1983) has noted that "Shanghai appears to be moving toward a pitch accent system" (p.182). Her observation can be strongly supported by the fact that here only the accented syllable has an underlying tone melody as shown in my analysis. If Shanghai is still a "pure tone language", there will be 25 possible prosodic patterns for disyllabic words and 125 for trisyllabic ones, since five tones are observed in citation form. In fact, the data show that only five patterns are relevant to each of the different length of words. Each pattern is strictly related to the inherent tone and syllable structure of the accented (or leftmost) syllable within the word or compound domain. This provides the evidence that the lexical tonal pattern of Shanghai is undergoing a shift from the syllable-based tone melody to the word-based tone melody. That is to say, the word or compound, monosyllabic, disyllabic or polysyllabic, composes a unique unit for a lexical prosodic pattern. This kind of shifting can be highly clarified if we relate it to the general tendency of lexical change in the development of Chinese. In archaic Chinese, most words in lexicon were monosyllabic, but, today, the majority words are disyllabic in Modern Chinese. The burden of differentiating the homophones of monosyllabic words has been reduced, and sound systems have been greatly simplified. Thus, the syllable-based tone melody is being gradually replaced by a word-based tone melody. This kind of shifting can also be observed in other Wu dialects in different degrees. It is with this new perspective that I propose the same phonological processes to derive the surface forms for either citation forms or sandhi forms.

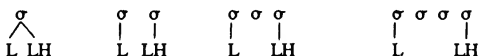
3.13 Melodic units: reconsidering the data of Wuxi

Based on the analysis of tone data of three Chinese dialects, i.e. Wuxi, Amoy and Danyang, Yip (1987) recently argues that tonal contours must be regarded as melodic units, just like the treatment of segmental affricates as units. Thus a branching structure within the tonal feature node is proposed, parallel to the segmental ones, as illustrated below:



Though both in (38a) have a single syllabic position associated with an ordered sequence of elements, only the representation on the left side allows reference to that sequence as a melodic unit which can be spread as whole. For example, tone pattern A in Wuxi, suggested by Yip, is /L(LH)/ underlyingly, which has a level part L and a contour part (LH). By spreading, each part anchors as a melodic unit to one edge of the domain:

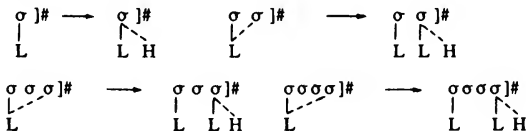
(39) Pattern A:



Then phonetic interpolation from L to L will give continuous low pitch as observed tone pattern. As a consequence, from a typological point of view, she points out, "Chinese languages make widespread use of tonal affricates, whereas African languages tend to lack them" (pp. 22-23).

Wuxi, spoken in Wuxi city about 80 miles north-west of Shanghai, it shares some properties of Shanghai. By reconsidering the data given in Yip (1987), I will propose another analysis which is similar to what I did above. For tone pattern A of Wuxi, I would rather propose only /L/ as the underlying representation and add a post-lexical rule applying at the post-lexical cycle of the derivation, Tone-Attachment rule, which attaches a tone with the opposite value of its preceding one to the edge of the lexical domain, similar to the [R]-Attachment rule presented in (26). The derivation of Pattern A, now, will be:

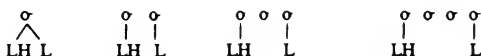
(40)



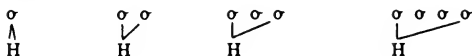
The output will be the same as what is derived from (39).

The same analysis can be applied to the other three tone patterns in Wuxi. Yip assumes that Pattern B, C, and D have the underlying forms /(LH)L/, /H/, and /L(HL)/ respectively. The derivations of them are given by her as follows:

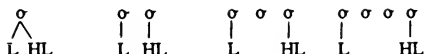
(41) Pattern B:



Pattern C:

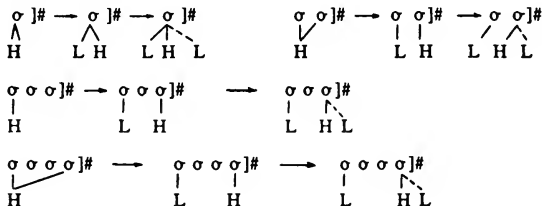


Pattern D:



Different from Yip's analysis, I will propose that Pattern B has the underlying form /LH/ and both Pattern C and D share the same underlying form /H/. The segmental property of the initial syllables within Pattern C and Pattern D is different: the former has a voiceless initial consonant while the latter has a voiced one (see chart (13) in Yip (1987)). Therefore, a lowering rule, similar to the rule (22), to lower the tone in the leftmost position can be proposed for Pattern D. After the spreading of H to the right edge, the H in the leftmost position can be replaced by a L tone when applying this Lowering Rule, then, the Tone-attachment rule is applied at the post-lexical cycle:

(42) Pattern D:

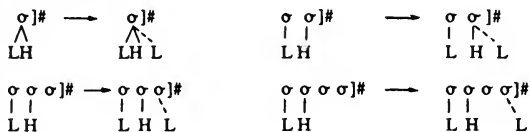


For Pattern C, according to the original pitch patterns shown in (14) of Yip's paper, there is a fall near the end in disyllabic, trisyllabic and quadrisyllabic forms. Thus the application of the Tone-attachment rule will give a more delicate output than what is shown in (41).

Now, let us consider the Pattern B. The original pitch pattern of Pattern B shown in (14) of Yip's paper shows that the high points in polysyllabic forms are on the second syllable instead of on the first syllable. When I propose a rising tone /LH/ for Pattern B, I assume that only the level tone can spread the whole domain such as in Pattern A, C, and D, i.e. only level tone can associate to the two ends of the domain as proposed by Yip. For the rising tone, the spreading of H will be blocked on the third syllable of the whole domain. This kind phenomenon can be observed in many Chinese dialects. For example, the data shown in (3) of Shanghai, the H does not occur on the syllables after

the second one when it is a contour tone covering the whole domain. Thus, the derivation of Pattern B will be:

(43) Pattern B:



Obviously, there is no need to propose the tonal contours as melodic units in the underlying forms of Wuxi. I think that the main part of the data in Danyang can be given the same analysis as I did above. Of course, as I pointed in Section 3.12 that, in the view of tonal typology, modern Chinese dialects seem on the way from the syllable-based tone melody to the word-based tone melody, there exist the phenomena that the contour tones are fixed on the syllable instead of on the domain of word when some dialects still remain in the early stage. Even in these cases, I do not see the reason to take contours as melodic units since they have already been considered as the syllable-based tone melody.

3.2 Feature underspecification

As noted in Sohn (1987), "a phonological system is more valued if it encodes all and only unpredictable properties in underlying representation" (p.1). Crucially depending on the asymmetry in phonological phenomena, the theory of underspecification provides a systematic way of eliminating overall redundant specifications in the underlying form.

In Shanghai, the asymmetrical behavior of the tonal features can also be detected. First, with respect to the specification of the underlying representations, there exists, of course, the contrast between [+U] and [-U], but there is no contrast between the syllable specified by [-U] and the toneless one. This is the evidence to characterize the asymmetry between [+U] and [-U]. Secondly, concerning subregister features, within the lexical level, no language-specific rules may refer to the feature [+R]. [+R] can be specified at the end of lexical domain. Thirdly, the tone of the syllable such as in the third position of AXXX, BXXX, CXXX and DXXX, to which no language-specific rules apply, always surfaces as [M] which is specified by [-U] and [+R]. Obviously, the existence of such asymmetry of the tonal features in Shanghai gives the possibility of taking [-U] and [+R] as default values. As a consequence, to gain the minimal specifications in underlying representation, only the H is marked as [+U] while the L is left unspecified in my analysis. As proposed in Pulleyblank (1986), [-U] is the default value assigned by UG for two-tone system, and [+R] is the default value also assigned by UG in realization of three or four tones. Following his suggestion, it is reasonable to assume that the default rules formulated above are supplied by UG, and the default [-U]-insertion rule (14) applies immediately after the entering of the marked underlying form of the accented or leftmost syllable (or morpheme), while the default [+R]-insertion rule (24) applies at the end of lexical cycle.

The result of allowing minimal necessary information in the underlying representation under the feature underspecification system simplifies the phonological rules. There is no need to propose the tone deletion rules as in Z & M (1979) or the rule

of L-insertion as a language-specific rule both in Z & M and Yip (1980).

3.3 Coplanar representations for tone melody

Roughly speaking, there are two models of tonal representation used in the current theory. One is "multiplanar" model; another is "unitiered" model. Here I use the terms "multiplanar" and "unitiered" as well as "coplanar" as strictly defined by Archangeli (1985) in her analysis of vowel features in Yokuts harmony. Namely, in the unitiered model the features are in a single matrix on a single plane, and with the multiplanar model the features are in single matrices on separated planes, while the coplanar model is that the features are on the same plane but in separated tiers. In this article I use the coplanar model for tonal representation. Drawing on data from Shanghai, I argue here that tonal features are coplanar.

The analysis of Shanghai tones shows that the register feature [upper] and subregister feature [raised] are relatively independent. The phonological processes may only refer to either of them, for example, only register feature is involved in application of the rule of Contour Formation (15), and only subregister feature is involved when [R]-attachment rule (26) is applied. Thus, that [upper] and [raised] are assumed as autosegments and are arrayed on separate tiers may capture such characteristic of the phonological processes. On the other hand, there exists some sense of dependency between these two tonal features. Logically, register feature is primary, comparing to the subregister feature, to describe the pitch value of certain tone melody since it stands higher than subregister feature in the feature hierarchy and it can be defined without the specification of subregister feature. That, in Shanghai, only register features are used to specify the underlying representation of tone melody can be viewed as evidence of that. On the contrary, the assignment of subregister feature may only refer to the values of register feature. For example, [-R]-spreading (32) takes the feature values of the register tier as its condition. Thus these two tiers form a single plane with register tier anchors on the tone-bearing unit and subregister tier anchors on the register tier, which may represent the internal structure of these two different features within tone melody plane.

Now, let us compare this coplanar model with other two models in handling the data of Shanghai. Yip's (1980) proposal can be viewed as a multiplanar model since register feature and subregister feature are arrayed in the separate planes as shown in (11). With regard to the analysis of Shanghai data, there exist at least two serious problems. First, her model does not allow the value of the contour tone crosses the middle line of the pitch range within a syllable because she assumes that only subregister feature (Tone) may occur in sequence while Register remains constant over the syllable. Therefore, she failed to derive the desirable output, for example, [HL] for tone A and [H-ML] for AX since they are not limited in each half of the pitch range. She noted it as "nothing but a non-phonological prolongation of the essential tone" though it "actually falls right down to the lowest possible pitch" (p.201). But, anyway, such kind "cutting" is not satisfactory for the description of tone melody in Chinese. Secondly, the multiplanar representation cannot, in formal sense, capture the internal relation between these two different features as noted above. For example, the rule of [-R]-spreading (32) expressed in coplanar model shows neatly that this phonological process is dependent on the values of register tier and irrelevant to the sequence of the tone-bearing units, while under the multiplanar model the tone-bearing units are always involved and thus blur the picture, as illustrated below:

(44) Coplanar:

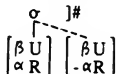


Multiplanar:



Most studies on tone phenomena in current theory take the uniterated model for tonal representation, in which tone features are assumed to occur in the feature matrices which comprise a single plane or a single tier, and "all tonal specifications in such an approach would be on a single tier" (Pulleyblank 1986, p.15). There is no difference between uniterated model and coplanar model if only register features are used to specify the tonal values in a language. But, if the subregister features are involved in the phonological processes, the formulation in terms of uniterated model is far more clumsy. For example, under this model, the rule of [R]-attachment will be presented as below:

(45) Uniterated:



Obviously, since the uniterated model fails to represent the internal organization of features, the rule in (45) is costly, comparing to (26).

Based on the discussion above, I conclude that the coplanar model is preferred for tonal representations as evidenced by the Shanghai tones, and furthermore, the argument here may also be considered to support the suggestion, made in Archangeli (1985), that "coplanar representations are the universal default representations".

NOTES

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¹ The formal notations used in this article are: 'σ' as syllable for the tone-bearing unit; '*' as accent marker; ']'# as word or compound boundary; '|' means linking and '≠' delinking.

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RULE EXPANSION ON THE FLY:
A GPSG PARSER FOR JAPANESE/ENGLISH
USING A BIT VECTOR REPRESENTATION OF FEATURES AND RULE SCHEMAS

Tsuneko Nakazawa
Laura Neher

We have implemented a Japanese/English parser based on Generalized Phrase Structure Grammar. Syntactic categories (sets of features) and rule schemas are represented internally by bit vectors, which allows efficient expression of rule schemas on the fly during parsing, according to the principles of GPSG, avoiding the combinatorial explosion of expanded rules.

1. INTRODUCTION

We have implemented a Japanese/English parser, based on the linguistic framework of Generalized Phrase Structure Grammar (GPSG), as presented in Gazdar (1985). The focus of this paper is on the internal representation of syntactic categories and rule schemas, and the incorporation of the representation into a modified chart parser. An efficient representation using bit vectors has been devised, which allows rule schemas to be expanded on the fly during parsing in accordance with the principles of GPSG. Because of the representation, operations on features are reduced to logical bit operations.

The program has several parts. The first takes a set of feature value pairs as input and produces a bit vector representation of them as output. A lexicon and grammar are then translated into a corresponding bit vector representation. Finally, the categories which are used in the grammar and lexicon are organized into a discrimination net and lattice to facilitate retrieval and matching during parsing.

2. RULE EXPANSION

Our decision to expand rule schemas during parsing is motivated by the desire to avoid the combinatorial explosion which would result if all of the rules of the grammar were fully expanded before parsing. In GPSG, syntactic categories are represented as sets of features; within rule schemas, the values of some or all of these features may be left unspecified. The set of possible

The order of bit assignment is arbitrary, but is fixed, and the size of the vector is fixed given the specific grammar.

Next, the category representation program converts syntactic categories in the grammar to feature-value representations and then to vectors. VP, for example, is converted to [(V +)(N -)(BAR 2)], and the inapplicable bits are turned off in the corresponding vector:

```
(3)          #*1001001111111
(V -) _____|:|:|
(N +) _____|:|:|
(BAR 0) _____|:|:|
(BAR 1) _____|:|:|
```

In this example, the values of the bits for SUBCAT, PAST and AGR features are one, indicating they are unspecified.

When a category has a category-valued feature specified, the bit corresponding to the feature is turned off and its category-value is represented by the second vector:

```
(4)  VP(AGR NP) #*1001001111110
      NP          #*0110001111111
      ^-----AGR
```

Finally, for each syntactic category, a unique symbol of the form CAT_n (n is an integer) is internally created. The first vector is associated with the symbol as a property called BIT, and the second vector, if any, as a property AGR, whose existence is indicated by the zero value for the AGR bit in the BIT vector. If more than one category-valued feature is specified, vectors corresponding to each category-value are associated in the same manner.

3. FEATURE OPERATIONS

Gazdar (1985) defines two feature operations which are important in parsing: extension and unification. An extension is defined as follows: category A is an extension of category B if and only if (1) all of the feature-value pairs of category B are present in category A, and perhaps more, and (2) all of the category-valued features of B have the same values, or extensions of those values in A. VP, VP(PAST +) and VP(AGR NP) are all extensions of VP.

Extensions can be defined in terms of bit vectors: Category A is an extension of category B iff

(A's BIT value) v (B's BIT value) = (A's BIT value).

This is implemented by a primitive function log-ior

(inclusive or) which takes two vectors as arguments. If either category contains a category-valued feature, the extension operation is repeated for the vectors associated with the category-valued feature.

The second feature operation is unification. The unification of two or more categories is the smallest category which is an extension of each, if one exists. For example, the unification of [(N +) (V -) (BAR 0)] and [(N +) (SUBCAT 1)] is [(N +) (V -) (BAR 0) (SUBCAT 1)]. The unification of [(N +) (V +) (BAR 0)] and [(N +) (V -)] is undefined because of the conflicting values for V. In our bit vector representation, unification involves comparing the values of categories for each atomic feature, using log-and. If the result is zero, the operation fails. Otherwise, the result becomes the new value for that feature, and the operation is repeated for the next feature in the vector. Finally, the unification of category valued features involves unifying each atomic feature within the category vectors.

4. THE PARSER

Our implementation uses a chart parser, Earley (1970), a bottom-up, non-deterministic device. The input directs which rules are tried. All completed nodes are recorded in the chart, and all intermediate results are saved.

After the rule schemas of the grammar are represented in bit vector format, they are organized into a network which facilitates bottom-up parsing. The first constituent of each rule schema is given a PREDICTS property. The value of that property is a list of the remaining sisters in the rule schema, followed by the mother. If a category is the first constituent in more than one rule, then the PREDICTS property for that category contains a list of such elements. The parser adds new predictions to the chart, and attempts to match the new predictions to the previous ones, until all of the input is processed.

5. LATTICE OF EXTENSIONS

Because we are dealing with rule schemas in parsing, in determining which categories' predictions to consider, note that any categories to which the input category is an extension are candidates. To provide an efficient mechanism to retrieve all underspecified categories given an extension, we organize all categories into a lattice. Following the directed arcs from an input category through all possible paths retrieves all and only the categories to which an input category is

an extension.

6. FEATURE INSTANTIATION PRINCIPLES

GPSG proposes feature instantiation principles, restrictions, and default values which we discuss below. The feature instantiation principles are invoked when a rule is about to be added to a parse tree.

7. THE HEAD FEATURE CONVENTION

When the head of a rule schema is matched with an extension, the head features of the extension must be "passed up" to the mother. If, for example, the head of a VP expansion rule matches with VO(PAST +), the mother, VP, must be marked as (PAST +) as well, since PAST is a head feature. Mapping the head features onto the mother involves several additional pieces of information. The first is a bit vector, initially of ones, which indicates which features are head features. This is created when the feature representation is created, by turning off those features marked in the input as head features. This vector is associated with a global variable *head-feature* as a BIT property.

A second vector associated with each category (called BIT2), screens out the inherited features of the mother, since they are not subject to the HFC. In the BIT2 vector, all bits that correspond to inherited features are turned on. The BIT2 vector for VP is represented as:

```
(5)      **11 11 111 000   00   0
          V  N  BAR SUBCAT PAST  AGR
```

Now assume that the head of the rule schema (VP -> VO NP) matches with VO(PAST +). The program alters the mother VP to VP(PAST +) by the following sequence of logic operations¹:

```
(6)  BIT of head (VO (PAST +))  **1001100000101  1
     BIT of mother VP           **1001001000111  2
     BIT2 of mother VP          **1111111000000  3
     BIT of *head-feature*      **00000000111000  4

     3 v 4                       **1111111111000  5
     5 v 1                       **1111111111101  6
     6 ^ 2 = VP(PAST +)         **1001001000101  7
```

When the head feature modifies an existing vector, a new category symbol is created if necessary. All of the categories of the grammar are stored in a binary discrimination tree for efficient retrieval.

8. FOOT FEATURE PRINCIPLE

The Foot Feature Principle (FFP) governs the agreement properties of unbounded dependencies. All foot features are category-valued. The FFP constrains the instantiation of these features in the following manner: the unification of the foot features instantiated on the daughters must also be instantiated on the mother.

The implementation of the foot feature principle is straight-forward. Inherited feature specifications and non-foot features are screened out of the vector of each daughter in a similar manner to the HFC. The unification of the resultant vectors of all daughters is then obtained; the unification and the BIT vector of the mother is and-ed to turn off bits for instantiated foot features on the mother; and the category under the relevant property of the daughter is copied onto the same property on the mother.

9. FEATURE COOCCURRENCE RESTRICTIONS

Feature cooccurrence restrictions (FCRs) provide further constraints on possible categories by indicating two or more feature values which cannot coexist in a category. FCRs typically take the form of logical implications; for example (PAST +) --> (V +) states that any syntactic category which has the value + for PAST must also have a + value for V.

In our implementation, FCRs are formulated as illegal bit patterns in BIT vectors. First, note that the above FCR is equivalent to $\sim[(\text{PAST } +) \wedge \sim(\text{V } +)]$. (V +) is represented as $\#*101111111111$ (assuming our original feature set) and $\sim(\text{V } +)$ is represented as $\#*001111111111 \vee \#*011111111111 \vee \#*111111111111$. Since (PAST +) is represented by $\#*1111111111011$, the above FCR is then represented by the following three bit patterns: $\sim\#*0011111111101$, $\sim\#*0111111111101$ and $\sim\#*1111111111101$. Syntactic categories which exhibit these patterns (checked with log-and) are blocked as ungrammatical.

10. FEATURE SPECIFICATION DEFAULTS

Finally, feature specification defaults (FSDs) are applied before the parse tree is accepted. These are default values for specific features which are valid if and only if the values of the features involved have not been specified after all instantiation principles have been applied. Invoking defaults is carried out with log-and as well.

11. JAPANESE PARSER AND MORPHOLOGICAL COMPONENT

Given an appropriate grammar and lexicon, our parser processes English and Japanese sentences in a similar manner; however, the morphological component has specifically been developed for Japanese. The concept of word has little reality in agglutinative languages like Japanese, and an input sentence in Japanese is a string of morphemes. The task of the morphological component is to segment an input string into morphemes and to label them with categories prior to parsing.

Entries of the Japanese lexicon consist of morphemes with their categories and conjugation classes. Since morphological alterations of morphemes are complex but regular with few exceptions, only one form of each morpheme is listed in the lexicon, and it is altered during the segmentation of an input string.

The morphological component is provided with context-free rules that represent morpho-phonological constraints on sequences of morphemes: ie. the rules admit a particular allomorph depending upon the category and conjugation class of the morpheme, and also upon those of the immediately following morpheme. Although the basic mechanism is that of a context-free parser, a theoretical distinction should be drawn between a syntactic parser and a morphological parser: while the former assigns constituent structures to an input sentence, the latter checks the morpho-phonological alterations of morphemes with respect to adjacent morphemes. After morphemes are identified and labeled with syntactic categories, the morphological information irrelevant to syntax is dropped and the syntactic parser is not concerned with specific forms of morphemes.

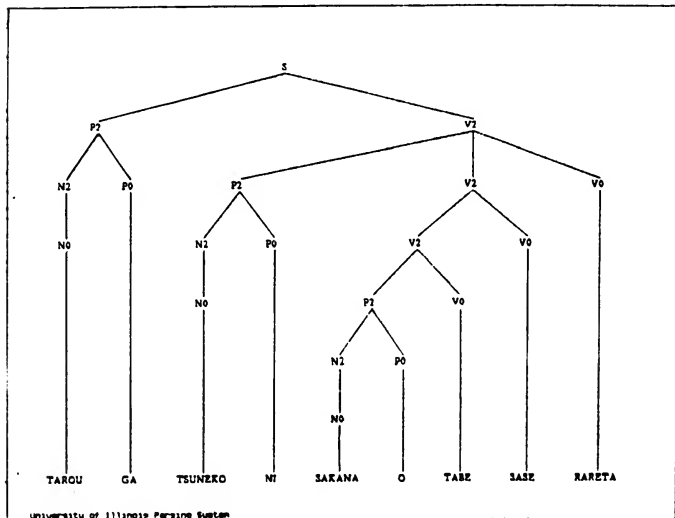
A linguistic question is the determination of syntactic units: strictly speaking, morphemes are the unit of morphology and not necessarily of syntax. The decision employed in the implementation is to list the morphemes in the lexicon which play syntactic roles in determination of syntactic structures of sentences: eg. morphemes that determine subcategorization frames ("want to" -tai-) and morphemes that iteratively appear in a sentence (causative -sase-, passive -rare-). The other morphemes are handled in terms of features in categories of those listed morphemes, as was traditionally the case with the English plural noun morpheme -s.

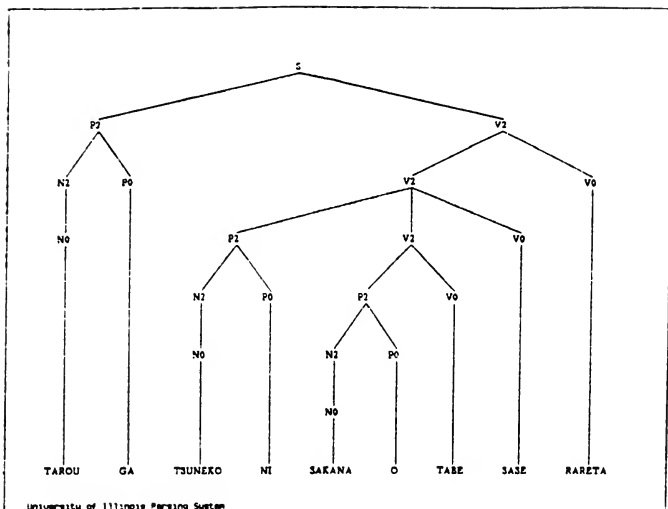
12. EXAMPLE PARSES

The example grammar for Japanese passive and causative constructions contains 17 schematic phrase structure rules, and each syntactic category consists of 9 features which take the total of 24 possible values. The complete instantiation of the rule schemas would expand the grammar of 17 rule schemas to at least 3¹¹ instantiated rules, which would require a considerable amount of search space and time for parsing. The parser instantiates unspecified features in the rule schemas only as necessity arises, according to the principles of GPSG and information associated with the input string in the lexicon.

The following input sentence is two-way ambiguous, and two parse trees are produced by the parser. The rule schemas are instantiated to no more than 30 rules in the course of parsing, which takes approximately 1.1 seconds.

- (7) Tarou ga Tsuneko ni sakana o tabe sase rareta
 Tarou SUBJ Tsuneko to/by fish OBJ eat CAUS PASS
 'Tarou was made to eat fish by Tsuneko.'
 'Tarou was made to feed fish to Tsuneko.'





13. CONCLUSION

Others working within the framework of GPSG have adopted a similar approach, among them Kay (1979), who proposes expanding metarules on the fly while parsing, and Barton (1985), who examines the implications of parsing with the separation of the immediate dominance/linear precedence (ID/LP) relation. Our parser takes a grammar in the form of context-free rules: metarules and the ID/LP separation have not been incorporated, nor has the Control Agreement Principle. As described in this paper, our main emphasis has been on representing features and rule schemas, and on feature instantiation during parsing.

NOTE

- ¹ In this example, SUBCAT is not a head feature.

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GEMINATES AND INALTERABILITY IN MALAY*

Boon Seong Teoh

In Malay, an Austronesian language spoken in Malaysia, there is a very general rule that glottalizes /k/ to [ʔ] by removal of the point of articulation features in syllable codas, e.g. /masak/ 'to cook' [māsaʔ]. Malay also has a pair of vowel initial suffixes which geminate a preceding consonant and begin with a homorganic glide after high vowels. A natural analysis posits an empty X-slot for these suffixes which links to the preceding segment. With stems ending in a velar we incorrectly predict blockage of glottalization by geminate inalterability. The purpose of this paper is to attempt a solution to the above problem.

1.0 Introduction

Recent work in phonological theory has centered largely on the nature of phonological representations. Issues of phonological representation presented a very fertile area of research in the past decade. This work has suggested that the essentially linear representations of standard generative phonology need to be expanded in various non-linear ways to include the organization of segments into syllable 'trees' and metrical structures as well as autosegmental tiers. The development of richer notions of phonetic structure implies a richer notion of phonological structure as well. But as Kenstowicz (1985) aptly observes, such development 'counts as real progress only if we have not simply shifted complexity and indeterminacy from the rule system to the representational system. Thus crucial to the entire enterprise has been the search for principles constraining the structure of phonological representations and the ways in which rules may refer to and manipulate such representations'.

In this paper we examine the general rules of glottal formation and gemination and see how phonological representation can restrict rule application and account for the phonetic facts in Malay.

2.0 Data

Malay has 19 consonantal phonemes which are as follows:

(1)

stop	p b	t d	k g	ʔ
affricate		c j		
continuant		s		
liquid		l r		
nasal	m	n ñ	ŋ	
glide		h y	w	

and a vowel inventory of six underlying vowels /a,i,u,e,o, and ə/ (ə = schwa). Malay has three suffixes:

(2)

/-an/	---	nominal suffix	
/-i/	---	verbal suffix	(semantic role of goal, benefactive).
/-kan/	---	verbal suffix	(transitivization and semantic role of accusative, benefactive).

We find the following alternations in the language:

(3)

/masak/	'to cook'	{māsa?}
/masak + kan/	'cook' (imp.)	{māsa?kan}
/masak + an/	'cooking, dish'	{māsa?kan}
		*{māsa?an}
		*{māsakan}
/masak + i/	'cook for'	{māsa?ki}
		*{māsa?i}
		*{māsaki}
/galak/	'to encourage'	{gala?}
/galak + kan/	'encourage!'	{gala?kan}
/galak + an/	'encouragement'	{gala?kan}
		*{gala?an}
		*{galakan}
/masuk/	'to enter'	{māso?}
/kě + masuk + an/	'entrance'	{kēmāso?kan}
		*{kēmāsokan}
		*{kēmāso?an}
/masuk + kan/	'enter!' (imp.)	{māso?kan}
		*{māsokan}
		*{māso?an}

/gërak/	'to move'	[gëra?]
/gërak + kan/	'move!' (imp.)	[gëra?kan]
/gërak + an/	'movement'	[gëra?kan]
		*[gëra?kan]
		*[gëra?an]
/hëndak/	'to want'	[hëndä?]
/di + kë + hëndak + i/	'needed' (pass)	[dikëhëndä?ki]
		*[dikëhëndäki]
		*[dikëhëndä?i]
/bër + kë + hëndak + an/	'need for something'	[bëkëhëndä?kan]
		*[bëkëhëndäkan]
		*[bëkëhëndä?an]
/rosak/	'spoil'	[rosa?]
/mëN + rosak + kan/	'to spoil' (act.)	[mërosa?kan]
		*[mërosakan]
		*[mërosa?an]
/kë + rosak + an/	'spoil'	[kërosa?kan]
		*[kërosakan]
		*[kërosa?an]
/di + rosak + i/	'spoil' (pass.)	[dirosa?ki]
		*[dirosaki]
		*[dirosa?i]

In the above data we note that the velar stop in syllable coda position glottalizes to [ʔ]. In loanwords too this glottalizing effect seems to be at work.

(4)

[bEʔ or bEkʔ]	'beg'	Note: (E = ɛ)
[raʔbi]	'rugby'	
[baʔti]	'service, deed'	
[taʔde]	'fate'	

The following are further examples of consonant stem final words when suffixed with /-an/, /-i/ and /-kan/.

(5)

		<u>slow speech</u>	<u>fast speech</u>
(a)	/lëtup/	'explode' [lëtopʔ]	[lëtopʔ]
	/lëtup + an/	'explosion' [lëtopʔpan]	[lëtopan]
	/lëtup + i/	'to explode' [lëtopʔpi]	[lëtopi]
	/lëtup + kan/	'explode' (imp) [lëtopʔkan]	[lëtopʔkan]
(b)	/ikat/	'tie' [ʔikat or ikat]	[ʔikat - ikat]
	/ikat + an/	'ties' [ikatʔtan]	[ikatan]
	/ikat + i/	'to tie' [ikatʔti]	[ikati]
	/ikat + kan/	'tie' [ikatʔkan]	[ikatʔkan]

- (c) /kənal + an/ 'acquaintance' [kənállan] [kənālan]
 /di + kənal + i/ 'known' [dikənállī] [dikənāli]
- (d) /rumus + an/ 'formula' [rumōssan] [rumōsan]
 /asas + i/ 'fundamental' [asassi] [asasi]
- (e) /tanam + an/ 'plants' [tanāmmān] [tanāmān]
 /di + tanam + i/ 'planted at' [ditanāmmī] [ditanāmī]
- (f) /pər + tandiŋ + an/ 'competition'
 [pētandēŋŋān] [pētandēŋān]
 /mĕN + tandiŋ + i/ 'to compete' [mĕnāndēŋŋī] [mĕnāndēŋī]
- (g) /pər + jalan + an/ 'journey' [pĕjalannān] [pĕjalanān]
 /mĕN + jalan + i/ 'to undergo' [mĕnjalanni] [mĕjalanī]
- (h) /putar + an/ 'revolutions' [putarran] [putaran]
 /mĕN + putar + i/ 'to revolve' [mĕmūtari] [mĕmūtari]
- (i) /pilih + an/ 'choice' [pilehhan] [pilehan]
 /mĕN + pilih + i/ 'to choose for' [mĕmīlehi] [mĕmīlehi]

In the above data, we note that when consonant-final stems are suffixed with vowel-initial suffixes the final consonant of the stem is geminated. In slow speech this is very obvious. In the so-called fast speech, however, there seems to be degemination.

Further data reveal that when vowel final stems are suffixed with /-an/ and /-i/ we have the following:

(6)

/kĕ + jadi + an/	'happening'	[kĕjadiyan]
/pandu + an/	'guide'	[panduwan]
/tĕmu + i/	'to meet'	[tĕmūwi]
/suka + i/	'to like'	[suka?i]
/kĕ + suka + an/	'happiness'	[kĕsuka?an]

The data above show that vowel-final stems surface differently when suffixed with /-an/ and /-i/, i.e. a homorganic glide is found after high vowels and a glottal stop after the non-high vowel.

Data from two other dialects in Malaysia, namely the Kelantan and the Terengganu dialects, reveal the following:

(7)

		<u>Standard Malay</u>	<u>Kelantan</u>	<u>Terengganu</u>
/masak/	'to cook'	[māsa?]	[māsa?]	[māsa?]
/masak + an/	'dish'	[māsa?kan]	[māsa?kĕ]	[māsa?kaŋ]
/masak + kan/	'cook'	[māsa?kan]	[māsa?kĕ]	[māsa?kaŋ]

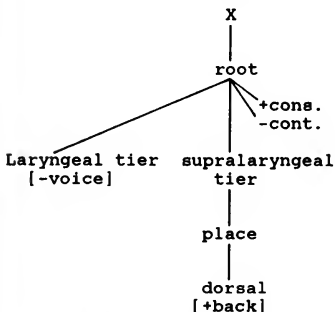
/ikat/	'to tie'	[ikat]	[ikaʔ]	[ikaʔ]
/ikat + an/	'ties'	[ikatan]	[ikaʔtɛ̃]	[ikaʔtaŋ]
/ikat + kan/	'tie!'	[ikatʔkan]	[ikaʔkɛ̃]	[ikaʔkaŋ]
/lētup/	'explode'	[lētopʔ]	[lētuʔ]	[lētuʔ]
/lētup + an/	'explosion'	[lētopan]	[lētuʔpɛ̃]	[lētuʔpaŋ]
/lētup + kan/	'explode!'	[lētopʔkan]	[lētuʔkɛ̃]	[lētuʔkaŋ]

The data above illustrate that glottalization not only applies to velar stops in the Kelantan and Terengganu dialects, but all voiceless stem-final obstruents are affected as well. From the data above we can establish the stem final /k/ to be the underlying form of words in /masak/, /masuk/, /hëndak/ etc. In these dialects the stem final /k/ resurfaces after the glottal stop. If we take the position that the stem final is an underlying /ʔ/, the learner would then have to memorize which allomorphs of the suffix /-pan/, /-tan/ and /-kan/ each stem takes. Such an analysis lacks descriptive adequacy.

3.0 Analysis and discussion

Given the phonological representation that is available in Sagey (1986), we might represent a voiceless velar stop as follows.

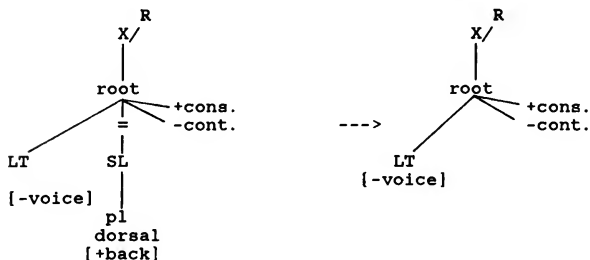
(8) Representation of a voiceless velar stop



The above is a representation of the voiceless velar stop [k] in Malay. In this representation, the supralaryngeal tier dominates the place node, which in turn dominates the terminal node Dorsal, which is specified as [+back]. The laryngeal tier, where voicing is specified, has the feature [-voice]. In this representation, the manner of articulation is independent of the supralaryngeal tier (cf. Clements 1985).

We might then formulate the glottal formation rule (GFR) for Malay as one which delinks the supralaryngeal node of a /k/ segment in syllable coda position. Thus a root with {+cons., -cont.} manner of articulation and with [-voice] specified at the laryngeal tier without a supralaryngeal tier will be realized as a glottal stop [ʔ]. The GFR is thus seen as the result of the delinking of the supralaryngeal node of the velar stop (and for all voiceless stops for the Kelantan and Terengganu dialects) from the root-node at syllable coda position leaving only the laryngeal node linked to the root node.

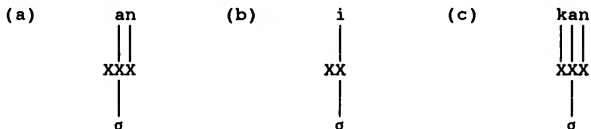
(9) Glottal Formation Rule (as delinking)



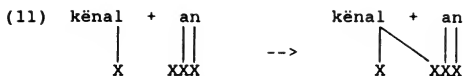
With the above rule we can then account for stems in Malay which end in a voiceless velar stop and in general for voiceless velar stops in syllable coda position.

We shall also at this juncture crucially assume that vowel-initial suffixes in Malay, i.e. /-an/ and /-i/ possess an underlying representation with an extra empty/featureless X-slot as shown below:

(10) Underlying representation of suffixes in Malay

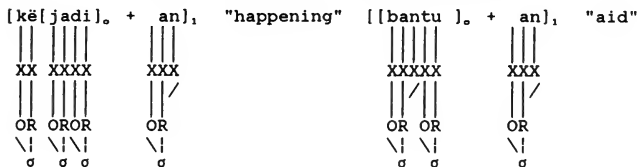


A natural analysis that ensues from these underlying representations is to say that the final segment of the stem then links to the empty X-slot of the suffix. With this we would then account for all the geminated forms of stems ending in a consonant other than a voiceless velar stop when suffixed with /-Xan/ or /-Xi/.

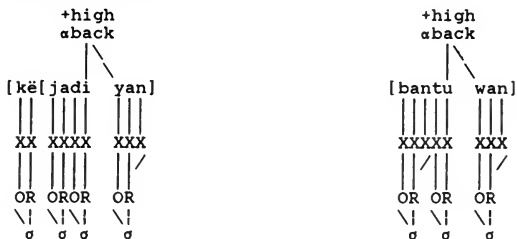


The homorganic glide which appears in stems ending with a high vowel can be explained by the same feature spreading rule. In this case, however, only the features of [+high a_{back}] features of the supralaryngeal node of the final vowel of stem spread on to the available empty X-slot of vowel initial suffixes. Since the melody which is realized in the onset of the syllable it appears as a glide.

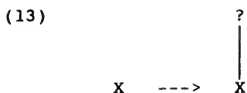
(12) Spreading of [+high a_{back}] features



Feature spreading

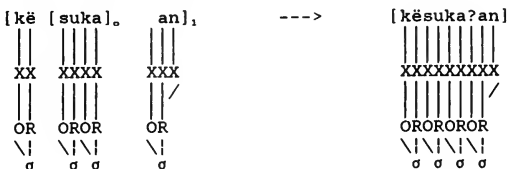


To account for the manifestation of the glottal stop in words like [kəsukaʔan] and [sukaʔi], we note that the stem ends in a [-high] vowel /a/. Evidently the spreading of features unidirectionally spreads only high features from left to right. Since nothing spreads from stems ending with low vowels, we would invoke a default rule to account for the glottal stop in the empty X-slot of vowel initial suffixes which essentially says that no X-slot shall remain unspecified.



Unspecified empty X-slot shall by default be realized as [?]

(14) Glottal formation by default



Given the fact that gemination is seen as spread how would one fit this analysis into Hayes (1986a, 1986b), Schein & Steriade (1986) with regards to their observation about the interaction of phonological rules with geminates? In Steriade & Schein (1984) proposals about how geminates can be represented within a non-linear framework were made. Distinctions were made between a monosegmental geminate, i.e. a segment with multiple associations to the skeleton, and a bisegmental heteromorphic geminate or adjacent identical cluster. Such a distinction is deemed necessary as increasing evidence (Kenstowicz & Pyle (1973), Steriade (1982), Hayes (1986a, 1986b) shows the failure of segments forming halves of geminates to undergo rules they would a priori be expected to undergo. The standard example from Tigrinya by Schein (1981) and Kenstowicz (1982) shows how when a velar stop forms the first half of a monosegmental geminate, (or true geminates à la Hayes) postvocalic spirantization, (i.e. /k/ --> [x] / V__) fails to apply; heteromorphic geminates (or false geminates) do, however, permit spirantization. Thus we have the following data from Tigrinya:

(15)

- | | | | |
|-----------------|-----|-----------|---------------------|
| a. /ʔaḵalëb/ | --> | [ʔaḵalëb] | "dogs" |
| | | | (cf. [kälbi] "dog") |
| b. /fäkkär - ä/ | --> | [fäkkärä] | "he boasted" |
| | | | *[fäxxärä] |
| | | | *[fäḵkärä] |

In the above data, (15a), the obstruent /k/ spirantizes to [x], but in (b) the geminate /kk/ fails to undergo the postvocalic spirantization rule. The geminates are neither wholly nor partially spirantized, thus respecting the integrity of

geminate. This phenomenon has also been called "geminate inalterability" by Hayes (1986a).

It would seem that the application of GFR violates the integrity of geminates and should be blocked by the inalterability condition in the cases of stems with final velar suffixed to /-Xan/ and /-Xi/: /masak + Xan/ and /masak + Xi/ are realized as [mäsa?kan] and [mäsa?ki]. The inalterability condition does not block application of GFR to the word /masak + kan/ "cook!" (imp.) found in (7) above because underlyingly both identical segments are a result of morpheme concatenation and thus no multiply-linked representation appears.

The palatalization in English su[ks]ede, a[ks]ede poses a similar challenge to recent autosegmental theory. The most natural analysis completely assimilates the prefixal consonant, creating a multiply-linked geminate, as in (16).

(16)	sub+kede		->	sub+kede
				/
	X X			XX

But then by inalterability (Hayes 1986a) we expect either that palatalization will block on the geminate or that it will apply across-the-board to yield a long [s]. The palatalization of just the second half of the geminate is thus problematic. Steriade & Schein (1986) point out that Italian palatalizes the entire geminate (su[cc]edere) and appeal to the fact that Italian preserves consonant gemination while English does not to explain the palatalization facts. Since the English palatalization rule is a rather marginal phenomenon, however, one might legitimately wonder whether the su[ks]ede facts are a serious problem for autosegmental theory.

In this paper we can draw an analogous contrast between two languages of the Pacific, i.e. Malay and Toba Batak where there can be no doubt as to the productivity of the rules and hence the legitimacy of the problem. We have seen that in Malay the GFR glottalizes /k/ to [ʔ] by removal of the point of articulation features in syllable codas. Recall from (7) that in the Kelantan and the Terengganu dialects the GFR has been extended to the remaining stops /t,p/ and we find [ʔt] and [ʔp] in the gemination context

Toba Batak (Hayes 1986b) has at least two separate rules that create geminates by spread (17).

(17)	a.	n + C _i	->	C _i C _i
	b.	[-son] _i + h	->	[-son] _i [-son] _i

marisap hita "let us smoke"
[p p]

In both cases the geminates escape the Batak rule glottalizing pre-consonantal stops (18).

- (18) [-cont] C -> ?C lap pingOl "wipe-off ear"
 [? p]

Note: (O = ɔ)

Hayes cites these Batak data in support of the inalterability phenomenon as a diagnostic for multiple linking and hence that assimilation is autosegmental spreading, as originally proposed by Goldsmith (1981).

Thus, Malay and Batak contrast as English and Italian do with respect to inalterability. Crucially, Malay and Batak also contrast with respect to gemination. Malay has no morpheme internal geminates while Batak does (19).

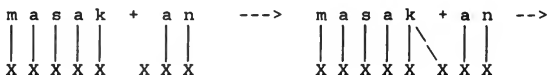
- (19) loppa "cook", pittu "door", nakkin "just now"

We might explain these facts by supposing that all grammars respect the OCP morpheme-internally and thus bar successive occurrences of the same phoneme but that English and Malay have an additional constraint barring geminates (20).

- (20) * C
 |\
 X X

When spreading rules create representations that violate this constraint (20) they are repaired by separating the derived geminate to yield single linking, whence the su[ks]ede and masa[?k]an facts follow. We have the following derivation for the word /masak + Xan/ 'the cooking, dish'.

- (21) (a)



- (b)



In Malay, this would then allow our GFR to apply and account for [mäsa?kan] "the cooking, dish" and [mäsa?ki] "to cook for". These results thus raise the more general theoretical question of how phonological constraints control rule application. An illegal representation created by spreading is repaired by minimal readjustment of the autosegmental linkings.

4.0 Conclusion

In our analysis we are able to account for the glottal stop in [māsaʔkan] for both the words with underlying structures as /masak + Xan/ and /masak + kan/, and [māsaʔki] for /masak + Xi/ in Malay.

In analyzing Malay we found that it does not in general allow geminates and a constraint like (20) above bars them from surfacing. However, the language has empty X-slots in the suffixes which allow spreading and create linked structures or geminates. Thus, the general question is raised as to how Malay like English can resolve in an efficient manner the question of gemination created by spread and overcome the general phonotactics of the language which bars such structures. This would then allow for phonological rules like the GFR to apply which would otherwise be incorrectly blocked from applying. We have given an explanation that relies on a minimal readjustment in the autosegmental linkings to make the representation conform to the Universal Grammar and language-particular constraints.

NOTES

*

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Mirror of Language: The Debate on Bilingualism

By Kenji Hakuta. New York: Basic Books, 1986. Pp. 268. \$9.95.

Reviewed by Cher-leng Lee

This book, as Hakuta says, has been written for two reasons(p. ix,x): first, to help parents, students, professionals, politicians and other concerned people decide about whether or not bilingualism is good(see p. ix). second, to remind colleagues in the social and behavioral sciences of the breadth of the research agenda of bilingualism, and to emphasise the importance of studying research problems related to bilingualism in their widest contexts. An additional expectation of Hakuta is that the book will serve as an inspiration for research to students in a variety of disciplines.

The nine chapters of the book (including an introduction, pp. 3 - 13, and a concluding chapter: reflections on bilingualism, pp. 231-241,) cover the following topics: bilingualism and intelligence (pp. 14-44); childhood bilingualism (pp. 45-72); the bilingual mind (pp 73-105); how children learn a second language (pp. 106-136); how adults learn a second language (pp 137-164); bilingualism in society (pp. 165-192) and bilingualism education (pp. 193-230). The book also contains a bibliography (pp. 243-255) and an index (pp. 257-268).

What we see, then, is that in these chapters, the "pieces of one puzzle" (p. x) have been put together. However, a problem remains: the book does not necessarily help one to make a decision for or against bilingualism. For most of the book, Hakuta presents opposing positions of an issue and then tries to "reconcile" the differences or "integrate" them. Although there is a general inclination favorable towards bilingualism, he does not make strong conclusions on the exciting ongoing debate on topics such as bilingualism and intelligence, the bilingual mind and second language acquisition for children and adults. Perhaps this is why he chooses to conclude the book with "reflection" rather than "conclusion".

It is only in the chapter on bilingual education, Hakuta suddenly loses his objectivity and makes a case for bilingualism without providing much evidence. As for his second purpose, it is obvious that he tries to show that the issues of bilingualism are not limited to linguistics or any single field of discipline, but involve a multitude of psychological, societal, and political realities (p. 9). This comes as a constant reminder in the concluding remarks of most of the chapters. As a result, one sees the interaction of various disciplines in the study of bilingualism.

Hakuta's balancing act, or the tendency towards "reconciliation" and "integration", reminds one of the East Asian (Japanese and Chinese) emphases on "harmony" and the "middle path" as opposed to an absolute stand. It is no wonder that Howard Gardner (1986: pp. 36-46) in his critical, but at the same time insightful review, attacks Hakuta for being "unable to reach any strong conclusions," (p. 44) and for standing on a "bland middle ground" (p. 44). Gardner's intolerance of Hakuta's approach of a "middle" way is apparent throughout Gardner's article.

Hakuta was prompted to write this book to provide information about bilingualism that is "at one scientifically non-technical and intellectually sophisticated" (p ix). This book is written more as a general text than a technical scholarly work. The book assumes little or no prior knowledge of academic bilingual issues on the reader's part. In many instances, Hakuta provides useful information to the lay reader: there are introductions to well known linguists, e.g. Benjamin Lee Whorf (p. 74); explanations of linguistic terms like "morpheme" (p. 119); background information on linguistic research, e.g. studies in first and second language acquisition (pp 116-119). There is also a good synopsis of current approaches to the subject e.g. the neurological approach (pp. 85-89); and excellent summaries of Chomsky's and Piaget's views on language and thought (pp. 80-83). Hakuta's mastery of the relevant literature is indeed impressive. In discussing various issues, Hakuta leads the reader step by step into the discussions of bilingual studies.

Another strength of this book is the way Hakuta tries to help readers see the specific issues in a wider context. For example, he points out that the psycholinguistic tests carried out should not be seen as yielding the absolute truth because different ways of testing give different results (p. 41). He also mentions that the attitude towards bilingualism is different in America as in a

multilingual society where people are expected to be universally bilingual (p. 164). Hakuta's book is also interesting to read because one could almost sense a personal and emotional narrator at the back of all the discussion.

Am I, then, fully satisfied with Hakuta's book? The answer is 'no': I have several problems with this book. First, Hakuta in choosing opposite views of the various issues does not seem to see the necessity of explaining the reasons for his choices. For example, in choosing to contrast the approach of Werner Leopold as a linguist (pp. 45-58) to Madorah Smith as a psychologist (pp. 59-65) in his chapter on 'childhood bilingualism', I feel that he owes readers an explanation of why he chose to compare specifically these two instead of others, e.g., E. Haugen, G. A. Miller, and others. In other words, a broader survey of the particular field of interest should be provided before he delves into the comparison of two particular individual researchers.

Similarly, in his discussion of 'bilingualism in society' (pp. 175-185) he simply selects four communities: the tribes of the Northwest Amazon, the inhabitants of Oberwart Austria, the Puerto Rican community in Jersey City and the bilingual situation in Canada to represent the positive examples of bilingual communities without much justification of his choices. One wonders why other bilingual communities, for example, that of Asia, Africa and other parts of the world are not cited. Even if it is due to the limitation of concentration in the subject, more explanation should have been given. It is important in this kind of discussion to provide a basis of comparison rather than seemingly citing four examples at random. This will not enable the readers to make generalizations about bilingual communities.

Hakuta's way of selecting the individual researchers for comparison and choosing the bilingual communities to discuss without qualifying why he is doing so reminds one of the way ancient Chinese scholars like Confucius would teach their followers taking for granted the respect for his authority of wisdom and knowledge over them. Is this then, again, a difference in culture causing a difference in assumption?

Second, there seems to be a problem of proportion in the treatment of subject matter on each topic. For example, Hakuta goes into great detail in describing the work of Werner Leopold on child

bilingualism (pp. 45-58), citing many examples of his descriptions of his daughter's acquisition of English and German. One wonders why Hakuta has to go into such length of description when the point is made after a couple of examples.

In contrast, in cases where one would like to see a clearer picture of what he is trying to drive at after listing the opposite views, he simply ends the chapter without any indication of direction. For example, in the chapter on 'bilingualism and intelligence (pp. 14-44), he leaves a dissatisfying remark in the conclusion that "the question of bilingualism and intelligence of whether they are linked positively or negatively, will evaporate in the face of deeper issues surrounding both bilingualism and intelligence" (p. 43). Surely, after leading the reader through the thick forest of methodological problems involved in the relevant topic, he owes the reader a guideline, however tentative it may be, to evaluate the results.

Related to this, is the way he discusses the chapter on 'the bilingual mind' (pp. 73-105). Hakuta did a good job in giving a synopsis of how this issue can be investigated at the neurology level (pp. 93-94). All these are very fascinating, however, he seems content to draw the conclusion that "there is no simple, one-to-one correspondence between psychological variables and neurological organization." (p. 102) Later in the same section, he reminds us again that "the mind is a complex thing, and we have restricted it to an account of knowledge, omitting other domains such as emotions and feelings." (p. 104) Much as I feel that this kind of reminder is important so that we will not become "victims of our own tunnel vision," (p. 105), I also feel that after having given us a picture of these various aspects of research into the bilingual mind, Hakuta should at least give a direction of how these different aspects can give further enlightenment to our understanding of the bilingual mind, rather than simply concluding that we should bear in mind other factors like cultures, emotions and feelings. It would benefit readers more if Hakuta had gone beyond this familiar reminder and provided a plausible path into understanding the mind.

Third, Hakuta's uses a variety of styles in the writing of the book. One gets the feeling that Hakuta is switching between his various intended audiences, and, therefore, Hakuta undertakes, as if were, 'style-shifts'. At times, he gets very descriptive about the methods involved in a particular research or the history of a certain

study e.g. the bilingual education in America (pp. 139-140). At other times, he tends to sound like a storyteller when introducing a chapter, for example, when he discusses 'how children learn a second language' (pp. 106-136) and similarly for 'how children learn a second language' (pp. 137-164) in which he has a section entitled 'A man named Alberto' (p. 139); in his discussion on bilingual societies, he has the subtitle: 'A country called Canada' (p. 183). There does not seem to be enough critical evaluation especially on issues where one would like to hear more clearly what an expert would like to say e.g. whether adults or children learn a second language better, whether there is relation between language and thought. It seems to me that Hakuta's lack of commitment to a particular style seems to have given him the convenience to avoid critical discussions when he does not want to commit himself.

Although in Mirror of Language, Hakuta attempts to review a broad spectrum of debatable issues on bilingualism, he seems to have only a particular readership in mind - the Western reader or even the American reader. This is obvious throughout the book: In 'bilingualism and intelligence', he traces the origin of the issue to the early American immigrants (pp. 16-22); even in broader topics like 'bilingualism in society' (pp. 165-192) and 'bilingual education' (pp. 193-230), Hakuta has predominantly discussed the United States. Since, bilingualism is not a phenomenon exclusive to America, Hakuta should give an explanation for the limited scope of his discussion. Moreover, since it is a book for general reading, Hakuta could do well in providing some references to the major bilingual communities in the world that have been widely discussed. For example, the works of Bokamba(1976), Kachru(1982, 1983), Noss(1982), Platt(1980) and others (see references). It is interesting to note that out of 281 items on his references, only one deals with Africa and none with Asian countries.

Despite the shortcomings mentioned above, Mirror of Language is still, to me, a valuable source of information for several fascinating topics on bilingualism, for example, the bilingual mind, how children and adults learn a second language. Hakuta does a good job in summarizing and synthesizing the important issues involved in these areas of research and presents them in a somewhat personal manner that makes it easy to read. It is an interesting book to recommend for classroom purposes as a survey of current research issues on bilingualism. The general problem of this book seems to be the ambiguity of his intentions: at times, he does not provide

adequate discussions, at other times, he dwells too much on the descriptions. However, any one interested in bilingualism will do well to read it. Mirror of Language may be a good example of how difficult it is to write an introduction on this important cross-cultural topic.

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THE REPRESENTATION OF DIPHTHONGS IN SPANISH*

Maria Carreira

On the surface, Spanish appears to have both falling and rising diphthongs. This paper will argue that only falling diphthongs exist as primitives while rising diphthongs are derived via a rule of contraction. The analysis presented will be defended on two counts: 1) it will be shown to account for certain stress properties of word-final diphthongs that have up to now escaped explanation, and 2) it will be argued that a phonological system such as that of Spanish which on the surface appears to have both types of diphthongs poses a serious problem for the acquisition of diphthongs unless one type of diphthong is assumed to be derived. We will conclude that a constraint that rules out more than one diphthong type in a language like Spanish is a desirable outcome from the point of view of learnability.

I. THE DIPHTHONGS OF SPANISH

A. On the surface, Spanish appears to have both rising and falling diphthongs₁:

1) vic.to.rya	"victory"	pa.ryen.te	"relative"
pyo.ho	"flea"	pwer.ta	"door"
a.gwa	"water"	a.gwi.ta	"water"
cwo.ta	"quota"		(dim.)
boy.na	"beret"	pey.ne	"comb"
gay.ta	"bagpipe"	aw.la	"classroom"
dew.da	"debt"	naw.ti.co	"nautical"

As the following examples suggest, the syllabicity of both prevocalic and postvocalic [+high, -cons] segments is not predictable from context. This difference must be

stipulated somehow and memorized as such by the language learner.

- 2)
- | | | | |
|-----------|----|--------|-------------|
| | a. | | b. |
| Ma.rí.a | v. | Ma.ryo | o.í.do |
| name | | name | "hearing" |
| | | | v. |
| | | | boy.na |
| | | | "beret" |
| cri.o.llo | v. | pyo.ho | a.ún |
| "creole" | | "flea" | "even" |
| | | | v. |
| | | | aw.la |
| | | | "classroom" |

Previous analyses (Harris 1983, Morgan 1985) have argued that both types of diphthongs contain the [+high, -cons] segment in rhyme position. Rising and falling diphthongs are represented as in (3a) and (3b), respectively.

- 3)
- | | | | |
|-----|----|---|-----|
| | a. | | b. |
| (C) | G | V | (C) |
| | | ∨ | V |
| | O | R | O |
| | | | ∨ |
| | | | R |

Harris (1983) cites two arguments in support of a representation like (3a) for prevocalic glides. The lack of co-occurrence restrictions between prevocalic glides and onsets (ie. pry.e.to, trwe.no, plye.ge...) suggests that prevocalic glides do not appear in onset position. The fact that prevocalic glides, like closed syllables, block antepenultimate stress when in penultimate position (ie. *en.fer.mo, *tro.pje.zo) argues in favor of a representation that includes the glide in rhyme position.

Post-vocalic glides are assigned a structure identical to that posited for syllable-final consonants because they pattern like such consonants in two ways: a) they do not allow syllabification of an additional consonant in the same coda₂ (ie. *es.culp.tor, *dewn.ta) and b) like syllable-final consonants, they block antepenultimate stress when in the penultimate syllable of a word (*u.ni.for.me, *a.plaw.so).

Thus, the fact that both types of diphthongs block antepenultimate stress when in penultimate position is captured in this analysis by the presence of a branching rhyme in (3a) and (3b).

However, while both prevocalic and postvocalic glides behave alike with respect to stress when in the penultimate syllable of a word, they exhibit very different properties when in word-final position. Nouns and adjectives with final syllables containing a rising diphthong always receive penultimate stress (ie. far.ma.cya, pur.ga.to.ryo). Falling diphthongs in the final syllable of a word always

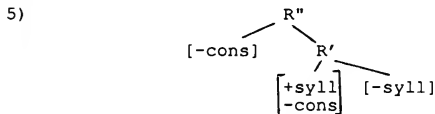
attract stress (ie. ma.mey, com.boy).

The representations in 3a) and 3b) fail to account for these stress properties of diphthongs. If rising diphthongs have a branching rhyme why don't they attract stress when in word-final position? That is, why don't they bear a similar stress pattern to other words that end in syllables with branching rhymes (ie. mamey, carbon)?

Another difference between falling and rising diphthongs concerns the number of tautosyllabic segments that they can be followed by. Rising diphthongs allow postvocalic consonants (as in 4a) while falling diphthongs do not (4b).

4)	a.	"death"	b.
	mwer.te	"good"	*boyn.ta
	byen	"loyal"	*pawr.ta
	fyel	"nap"	*cewl.ta
	syes.ta		*cews.ta

In order to account for this, Harris (1983) differentiates between falling and rising diphthongs by means of the representation in (5). Prevoalcalic glides are immediately dominated by the maximal projection of the rhyme (R"). Vowels and postvocalic glides form a constituent that is dominated by R'.



The impossibility of forms like (4b) is explained by the fact postvocalic glides and consonants occupy the same position in the rhyme. It follows from this that falling diphthongs will block the incorporation of any additional segment following the glide. Prevoalcalic glides, on the other hand, do not have this effect because they do not increase the size of the constituent that contains the vowel and the postvocalic segment.

While a representation such as (5) accounts for the facts in (4), it presents a problem for the stress properties of glides in word-final position. These properties are summarized below.

- 6) a. Prevoalcalic glides in the final syllable of a word always cause stress to fall on the penultimate

syllable (ie. far.ma.cja, pur.ga.to.ryo).

- b. Postvocalic glides, on the other hand, always receive stress (ie. ma.mey, con.boy, A.brew).

The stipulations that a representation such as (5) force us to make in order to account for the above facts are void of explanatory power. For (6a) we are forced to say that word-final vowels preceded by glides are always extrametrical. Otherwise, stress would incorrectly fall on the final syllable of words with a final rising diphthong. For (6b) we must stipulate that word-final glides can never be extrametrical. This will assure that stress will always fall on the final syllable.

The generalization made for postvocalic glides cannot be extended to postvocalic consonants since they don't always cause stress to fall in the final syllable.

6c)

ár.bo(l)	"tree"	ná.ka(r)	"mother of
diag.nó.si(s)	"diagnosis"		pearl"

To summarize, the accepted representation of diphthongs shown in (5) accounts for the fact that both prevocalic and postvocalic glides block antepenultimate stress when in the penultimate syllable of a word. However, such a representation fails to explain why the two types of diphthongs behave so differently with respect to stress when in word-final position.

A second difference between these diphthongs concerns the impossibility of adjoining a final consonant to syllables with postvocalic glides. No such restriction holds for syllables with prevocalic glides. A representation such as (5) allows us to account for these facts while maintaining the hypothesis that both prevocalic and postvocalic glides appear in rhyme position at all times in the derivation. However, (5) leads to ad hoc stipulations with regards to the stress pattern of word-final diphthongs.

The hypothesis that both prevocalic and postvocalic glides are part of the underlying inventory of syllable types in Spanish not only leads to costly stipulations for stress, but it also represents a highly marked option in Universal Grammar. Generally, languages exhibit one type of diphthong, but not both. For example, Slovak, which on the surface appears to have both falling and rising diphthongs, has been convincingly shown by Kenstowicz and Rubach (1987) to derive its rising diphthongs from underlyingly long vowels.

In the next section we will argue that rising diphthongs are always derived in Spanish. Falling diphthongs, on the other hand, must be specified in the lexicon. With this we eliminate the undesirable situation of having two types of diphthongs in the same language. In addition, such an analysis will allow us to account for all the stress properties of glides as well as for the conditions on syllable-final consonants in syllables with postvocalic glides.

II. THE STATUS OF PREVOCALIC GLIDES

Steriade (1984) posits a rule of syllabification that accounts for the distribution of high vowels and glides in Romanian. Such a rule is stated as follows:

(7) The CV rule: $(C)V > (C)V$
 | |
 O R

Where C=[-syll] or [0syll], V=[+syll] or [0syll],
 O=Onset, R=Rime; operates left-to-right.

An assumption of this analysis is that in Romanian some [+high, -cons] segments are unspecified for the feature syllabic in their underlying representation. Being [0syll], the CV rule will syllabify them either as onsets or syllable heads, depending on the context. [+high,-cons] segments are assigned to onset position under two conditions: a) if the [+high] segment is in word-initial position and is followed by a [+syll] segment, or b) if the [+high] segment appears between two [+syll] segments. In all other cases such segments are organized as syllable heads.

The CV rule, in conjunction with a rule of contraction and principles of extrametricality account for the difference between the Romanian stúdyu and skatiw. In this analysis, the syllabification contrast between these two items is attributed to a difference in stress pattern.

As is the case with Spanish, glide-final words in Romanian always receive final stress while those with a rising diphthong in word-final position always bear penultimate stress. Steriade suggests that this difference is due to the fact that the final segment in words like stúdyu is extrametrical while in words like skatiw the final [+high, -cons] segment counts for stress. Given this assumption, the derivation of each word proceeds as

follows. The contraction rule is first illustrated in (8).

(8) Contraction

	O R R		O R
			^
Condition:	C X X	>	C X X
i is unstressed	i u		i u
CV rule	s t u d i (u) O R O R R		s k a t i u O R O R R
Stress	s t ú d i (u)		s k a t í u
Contraction	s t u d y u		s k a t i u

Two additional rules derive the final forms (studyu, skatiw'). A rule of complex onset formation adjoins the initial /s/ in both words to the first syllable. A high vowel desyllabification (HVD) rule converts a [+high] segment into a postvocalic glide when it appears at the end of a word. HVD yields skatiw' from skati.u.

The analysis proposed for Romanian can be altered to account for the difference between Máryo/María. Let us suppose that the contraction rule is modified so as to apply between an unstressed high vowel and any onsetless syllable that follows. Whether the [+high, -cons] segment is incorporated into onset position or into the following rhyme will not concern us now. We will return to this question in section IV.

If we maintain the assumption that some [+high, -cons] segments are unspecified for the feature syllabic and allow the final segment in Máryo to be extrametrical we can account for the syllabification difference between Máryo and María. The derivation proceeds as follows.

(9) Contraction (revised)

	O R R		> O R
			^
Condition: [+high] is unstressed	C x x	>	C x x
	[+high]		[+high]
CV rule	M a r i (o) O R O R R		M a r i a O R O R R
Stress	M á r i (o)		M a r í a
Contraction	M a r y o		---

With this we explain the stress properties of word-final rising diphthongs. Maryo and Maria exhibit the only two possible stress patterns for word-final sequences of a [+high, -cons] segment and a vowel. The final syllable in Ma.ri.o (before contraction) does not receive stress because it is extrametrical. Consequently, stress falls on the antepenultimate syllable which becomes the penultimate syllable after contraction (Ma.ri.o --> Ma.ryo). In Ma.ri.a the final syllable will not be stressed because it is light. It follows that the penultimate syllable will receive stress, bleeding Contraction (Ma.ri.a).

Thus, final stress is never an option for word-final rising diphthongs because they start out as two separate syllables, the last of which is light. Since word-final light syllables in Spanish do not normally bear stress it follows that the final vowel in words that end in a rising diphthong will not receive stress either.

Antepenultimate stress is impossible when a rising diphthong appears in either final or penultimate position because before the operation of contraction the [+high] segment constitutes a separate syllable. What appears to be the antepenultimate syllable then, is really the fourth-to-last syllable at the time when stress assignment takes place. Since pre-antepenultimate stress is not possible in Spanish, it follows that rising diphthongs in penultimate position will appear to block stress. This is illustrated below.

	/t r a v i e s o/	/n o t i c i (a)/
CV rule	O R O R R O R	O R O R O R R
Stress	t r a v i é s o	n o t i c i (a)
Contraction	t r a v y e s o	n o t i c y a

With this analysis we eliminate the need to distinguish prevocalic glides from high vowels that constitute a syllable peak. [+high] segments that do not receive stress are turned into glides if they immediately precede an onsetless syllable.

This representation of diphthongs finds support in certain morphological processes that alter the stress pattern of the root. Consider the following words. The underived forms in 10A bear stress on the initial syllable. Suffixation causes stress to shift one syllable to the right.

(10)

A.

lu.́.na	"moon"	-->	lu.ná.ti.co	"lunatic"
ro.́.sa	"rose"	-->	ro.sa.ryo	"rosary"
ca.́.sa	"house"	-->	ca.so.na	"big house"

B.

ma.ní.a	"obsession"	->	ma.nya.́.ti.co	"maniac"
dí.a	"day"	-->	dyá.ryo	"diary"
Ma.rí.a	name	-->	Ma.ryo.na	augmentative of Maria

The importance of the above facts for our analysis lies in the fact that syllable peaks consisting of a [+high, -cons] segment undergo glide formation after suffixation causes the stress to shift away from them (10B). Thus, the process captured by our rule of contraction finds independent motivation in the phonology of Spanish.

Harris (1983) discusses an analysis which derives all glides from unstressed [+high] vowels but rejects it based on the following considerations:

1) While such an analysis accounts for the stress pattern of words with rising diphthongs in the final syllable, it fails to make the right predictions for glide-final words. That is, if word-final glides start out in a separate syllable and undergo stress assignment before contraction then two stress patterns should be attested:

- a. If the final segment does not count as extrametrical, then the penultimate syllable (which will become the final syllable after contraction) will bear stress (ie. con.bo.i -> con.boy).
- b. Alternatively, the penultimate syllable (penultimate after contraction, antepenultimate underlyingly) could bear stress as a result of extrametricality of the final segment (ie. con.bo.(i)). However, as we have seen, this last option is never attested since all glide-final words bear final stress. 2) A second argument mentioned by Harris against an analysis that derives all glides from a rule of contraction is based on the stress pattern of words like ná.w.fra.go and far.ma.céw.ti.co. If postvocalic glides start out in separate syllables then the above mentioned words would be receiving stress on the fourth-to-last syllable, an option that we have rejected for Spanish (ie. /ná.u.fra.go/,

/far.ma.çe.u.ti.co/). In order to account for surface antepenultimate stress on syllables with postvocalic glides we must assume that the glides do not start out in separate syllables.

While Harris' points are well taken with regards to prevocalic glides, they have nothing to say about prevocalic glides. They suggest that postvocalic glides must start out in the same syllable as the preceding vowel. However, none the above arguments apply to prevocalic glides. As we have already seen, the stress pattern of prevocalic glides is no problem for an analysis that derives all such segments from a contraction rule (see the derivation in (9)). The existence of words with stress on antepenultimate syllables with prevocalic glides (ie. cja.ti.ca) does not constitute an argument against such an analysis since stress falls on the third-to-last syllable regardless of the application of the rule of contraction.

To summarize, the analysis presented here eliminates the need to have prevocalic glides in the inventory of diphthong types in Spanish. Only falling diphthongs appear to need specification. The underlying representation of the glides in such diphthongs remains to be investigated. While it is unclear whether such segments should be differentiated from vowels via a feature specification or by being syllabified in the underlying representation, it is nonetheless clear that they should be singled out from other [+high] segments.

The facts presented for Spanish extend to Portuguese and Italian with minor modifications that do not affect the spirit of the analysis. Both of these languages, like Spanish, appear to have rising and falling diphthongs. Moreover, these diphthongs exhibit the same asymmetry with respect to stress when in the final syllable of a word.

For these languages too, we could claim that prevocalic glides are derived via a contraction rule while postvocalic glides are primitives. This simplifies the inventory of diphthongs in these languages and suggests that a claim that restricts language-particular syllabification rules to allow only one type of diphthong might be tenable. As we will see in the next section, this is a significant step for purposes of acquisition.

Before addressing the area of learnability, however, there is one final issue regarding the syllabification properties of [+high, -cons] segments that needs to be

addressed. An unstated assumption of our analysis has been that the CV rule (see 7) correctly syllabifies all [+high, -cons] segments. The left-to-right application of the rule guarantees that [+high] segments will surface in onset position under two conditions: a) at the beginning of a word if followed by a vowel or by another [+high] segment, and b) when the [+high] segment is in intervocalic position. These cases are illustrated below:

12)	a.		b.
	/i e m a/	"egg yoke"	/o i a/ "pot"
CV rule	O R O R		R O R
	[ye.ma]		[o.ya]

However, there are two potential problems that threaten the validity of the CV rule as a sufficient principle in accounting for the syllabification properties of [+high] segments. In Carreira (1988) I argue that lexical items that are spelled with hie (the -h is silent) must be distinguished from those spelled with ye in a number of phonological processes. At the segmental level, they both consist of a [+high, -back, -cons] segment followed by the vowel [e]. The organization of these segments at the syllable level however, appears to differ depending on the orthography. The [+high, -cons] segment in words spelled with ye behave like onset segments with respect to a number of processes. These pose no problem for the CV rule since the rule predicts that they should appear in onset position (as in 12a).

The forms spelled with hie however, appear to have the glide in rhyme position. Given our hypothesis that prevocalic glides that are not in onset position are always derived from a contraction rule, this would force us to conclude that these forms start out in two separate syllables and undergo contraction (ie. i.er.ba --> ier.ba). However, if the first segment is [+high] the CV rule will adjoin it to the onset. Crucially, it will not syllabify it as a rhyme. The CV rule will assign identical structures to forms spelled with hie as well as to those that start with ye. This is illustrated in (13).

(13)	[hierba]	*i e r b a
	CV rule	O R O R

What we need to distinguish between words spelled with hi and those spelled with ye is to have the former

in the rhyme of the syllable and the latter in onset position. However, if the derivation proceeds as in (13) then we have no way of distinguishing between words like hierba and yeso in terms of the organization of the segmental slots at the syllable level.

A promising way of distinguishing between these words has been proposed by Harris (1985). The claim of this analysis is that lexical items spelled with hie have an underlying representation that consists of the segment /e/ followed by a skeletal slot without segmental content. Such words are assigned the representation in 14a:

- | | | | | | | |
|-----|----|-----|----|-----|----|-----|
| 14) | a. | e V | b. | e e | b. | i e |
| | | x x | | x x | | x x |

The steps that map the underlying representation in (14a) into a representation that consists of a prevocalic glide and a vowel will be analyzed later in this paper. Suffice it to say at this point that the empty V-slot will receive the features of the vowel [e] (14b), and subsequently undergo diphthongization (14c). Adopting this solution into the proposed analysis, we can see that a representation such as 14a will be syllabified by the CV rule as two separate rhymes. This is exactly what we want since the only way to get the initial segment in a position where it can undergo Contraction is to have in a separate syllable. There is independent evidence that in Spanish the sequence "e e" is simplified to "i e".³ If this applies to the structure in (14b) the result will be a representation that can undergo contraction. The derivation proceeds as follows:

- (15)
- | | | | | | | |
|-----|---------|-----|-----|-----|-------------|-----|
| e e | --> | e e | --> | i e | --> | y e |
| x x | CV rule | x x | | x x | contraction | x x |
| | | R | R | | R | R |

To summarize, the threat posed to the CV rule by the need to distinguish between word initial -ye sequences that include the glide in the onset from those that assign the glide to rhyme position, can be eliminated if we adopt an analysis like Harris (1985).

A more serious problem for the CV rule concerns the existence of a small number of words that have intervocalic [+high] syllable heads (ie. [bo.í.o] (spelled bohío) "hut", [ba.í.a] (sp. bahía) "bay"). This is a threat to the validity of the CV rule because, as illustrated in 12b, intervocalic segments that bear the feature [+high] should appear in onset position. That is, the CV rule incorrectly

predicts that words like bohio and bahia will be syllabified as *bo.yo and *ba.ya.

One possible solution to this problem is to allow some [+high] segments to be specified as [+syll] in the underlying representation. This would account for the possibility of intervocalic [+high] syllable heads since the CV rule would not be able to incorporate these segments into onset position. However, this implies that a three-way distinction in the representation of [+high] segments must be allowed:

- a) [+high] segments specified as [-syll] become falling diphthongs (ie. naw.fra.go).
- b) [+high] segments specified as [+syll] are always syllable heads (ie. bo.i.o).
- c) [+high] segments that are unspecified for the feature syllabic are assigned syllable structure via the CV rule.

If a three-way distinction turns out to be necessary in the specification of [+high] segments, then this would constitute an argument in favor of Steriade's (1987) view of underspecification. Crucially, it would suggest that the D-value [+/-syll] for the feature [+high] is not absent from the underlying representation.

A second and perhaps more promising solution is to posit an underlying representation for words like bo(h)io and ba(h)ia that contains an empty x-slot before the [+high] segment. The existence of this segment is reflected in the orthography and is further justified by the historical fact that many words spelled with an [h] were once pronounced with an aspirated consonant.

Given this representation, the CV rule will assign the [+high] segment to rhyme position and the unspecified slot to its onset, yielding the correct surface form.

16)	b a i a	b o i o
	x x x x x	x x x x x
	O R O R R	O R O R O

The viability of this solution hinges on several things. First of all, the existence of an extra segmental slot that receives no segmental features has been justified by both the orthography and the historical facts. We predict, therefore, that intervocalic [+high] segments will be syllabified as syllable onsets (ie. V.GV) unless there is an orthographic -h. Consequently, if we find a significant number of words that bear no -h and are not syllabified as V.GV we will be forced to abandon this solution.

A second consideration concerns the interaction of this solution with the representation proposed in Harris (1985) for words that show vowel/glide alternations. As we have previously mentioned, the structure assigned to such words consists of an x-slot that bears the features of a vowel followed by an empty slot. A rule of diphthongization associates the feature [-consonantal] to this segment. Subsequently, a default rule assigns the features of the epenthetic vowel ([e]) to this position. Finally, the leftmost vowel is turned into a glide, forming a rising diphthong with the following segment. The derivation is illustrated below.

(17)

e	-->	e	V	-->	e	e	-->	i	e	
x	x	diph.	x	x	default	x	x	gliding	x	x

Crucially, the process outlined in (17) relies on the assumption that empty x-slots will be assigned the feature [-consonantal] (abbreviated as "V" above) and subsequently undergo the default rule. However, such an assumption is in conflict with the solution we have proposed for words like bohio and bahia. The empty x-slot in such words must not undergo the rule of default (ie. *boeio, *baeia). This position then, must somehow be assigned the value [+cons]. This is the only way to insure that the default rule will not apply.

To restate problem at hand, Harris' account of segments that show vowel/glide alternations proves to be important to our analysis because it allows us to explain the difference in syllabification between words like yema and hierro. However, the same account proves to be problematic for our analysis if we assume that words like bohio are syllabified as three syllables because of an extra segmental slot before the [+high] segment. Following the logic of Harris' account, we incorrectly predict that the empty x-slot in such words should undergo diphthongization and subsequently the default rule. What we need then, is a way to allow the default rule to apply to words like hierro but to be blocked in the case of bohio.

The CV rule provides such a way. Suppose that empty slots are parsed by the CV rule as segments that are unspecified for the feature syllabic. In other words, suppose that empty slots are treated the same as [+high, -cons] segments. When in intervocalic position such segments will be assigned to the onset. This is what happens with bo.hi.o. Otherwise, they will appear in

nuclear position as in hierro.

(18)	a.		b.
		b o i o	e rro
		x x x x x	x x x x
		O R O R O	R R O R

The default rule will fail to apply to the representation in (18a) because the segment [e] cannot appear in onset position. Such a rule will be applicable in (18b) since the empty segmental slot will be in nuclear position. The created hiatus in (18b) is resolved by a process which raises the leftmost member of a two vowel sequence. Subsequently, Contraction applies yielding a rising diphthong.

(18b')		e r r o
		x x x x
	default	e e r r o
	raising	i e r r o
	contraction	y e r r o

The CV rule eliminates the need to include a rule which assigns the feature [-consonantal] to an empty skeletal position. The syllabification algorithm correctly predicts that the empty skeletal position in words that show the vowel/glide alternation will appear in nuclear position. In addition, it yields the right results for words like bohio and bahia.

Thus, the potential problems raised by such words are eliminated if we posit an empty skeletal position before the [+high] segment and allow the CV rule to treat this slot like any other segment that is unspecified for the feature syllabic.

Before concluding this section and moving on to the issue of learnability let us summarize the findings made here. Steriade's CV rule goes a long way in accounting for the syllabic properties of [+high, -cons] segments in Spanish. It allows us to derive rising diphthongs via a rule of contraction. In doing so, we eliminate the need to include both rising and falling diphthongs in the underlying inventory of syllable types in Spanish. Falling diphthongs, as we have seen, cannot be derived via a contraction rule. The fact that stress is possible in antepenultimate syllables with falling diphthongs (naw.fra.go) suggests that these do not start out as separate syllables.

The CV rule faces a potential problem from words with

intervocalic [+high] syllable heads since it predicts that all such segments should surface as syllable onsets. The problems posed by forms like bohio and bahia however, appear to have a number possible viable solutions. Finally, we have sketched how the analysis presented could extend to Portuguese and Italian.

III. THE ACQUISITION OF [+HIGH, -CONS] SEGMENTS

In this section I will discuss why a phonological system such as that of Spanish poses a serious problem for the acquisition of prevocalic glides if we assume that such segments are represented as in (3a). In addition, we argue that the correct representation of prevocalic glides cannot be arrived at by the language learner unless we include a constraint in the grammar that rules out more than one diphthong-type in a language having the stress properties of Spanish.

Consider the evidence available to the language learner regarding prevocalic glides:

(19)

- a) Word-final syllables with prevocalic glides do not receive stress (ie. far.ma.cja, pur.ga.to.rjo...)
- b) Syllables with prevocalic glides allow the incorporation of a tautosyllabic postvocalic segment (tjes.to, kwen.ta...)
- c) There are no apparent co-occurrence restrictions between prevocalic glides and elements in onset position (trwe.no, plje.ge).

Of the three pieces of evidence mentioned above only the last one suggests that prevocalic glides appear in rhyme position. However, as we will see in section IV, there's reason to think that some co-occurrence restrictions hold between prevocalic glides and complex onsets. If this turns out to be the case, then none of the available evidence will actually point to a representation of prevocalic glides as in 3a). The first two pieces of evidence (19a) and 19b)) suggest that the glide might not be in rhyme position. If it were, it would tend to attract stress in word-final position and it would not allow the incorporation of an additional segment in the rhyme. Thus, the available evidence is, at best, inconclusive. Crucially, the most convincing piece of evidence in favor of a representation such as (3b), namely, that antepenultimate stress is not possible when there is a prevocalic glide in the penultimate syllable is not available to the learner since that constitutes negative

evidence. That is, while the absence of forms like ca.ryo.ca or a.sya.do constitutes an important piece of evidence for the linguist, it is not available to the learner as a source of guidance in the acquisition process.

In contrast to the difficulty encountered in determining the status of prevocalic glides, the structure of postvocalic consonants is easily determined. The fact that word-final falling diphthongs always receive stress suggests that they are part of a branching rhyme. The existence of forms like náw.ti.co, and cáws.ti.co confirms that falling diphthongs must not be derived.

If the syllabic properties of diphthongs in Universal Grammar are such that the existence of one type of diphthong rules out the possibility of the other one existing as a primitive, then the acquisition of falling diphthongs in Spanish should signal that rising diphthongs must be derived. This suggests that the choice of "glide type" available to a language might be expressed in terms of parameters. Setting the parameter one way blocks the opposite value of the parameter. With regard to Spanish, it seems reasonable to assume that the evidence available for falling diphthongs is more easily analyzed than that available for rising diphthongs. Therefore, setting the parameter to the value that indicates the existence of falling diphthongs should alert the learner to the existence of rules that derive rising diphthongs from a sequence of a [+high, -cons] segment followed by a vowel.

To repeat, if we accept the premise that negative evidence is not available to the learner, then we must conclude that a structure like (3a) poses problems for acquisition. As an alternative, we have suggested that the existence of one type of diphthong in a language might rule out the possibility of the other one existing as a primitive. In a language that appears to have both, this means that once the existence of one type has been ascertained the structure of the other must be derived from contraction-type rules.

There is a third possibility regarding the status of prevocalic glides that we have failed to consider. There is the possibility that both types of diphthongs are possible in the underlying representation of Spanish but that prevocalic glides have a structure that is different from (3a) -- a structure that poses no problems for acquisition. A priori, there is no reason to reject an analysis that claims that a language can have both types of diphthongs and posits structures for each type that facilitate the acquisition of each. Such an account would

not be inferior to one that claims that only one diphthong type is possible in a language and derives the other by rules of contraction.

If no principle of grammar rules out the possibility of more than one diphthong-type in a language and there is a structure for each type that does not pose the type of problems shown to exist for (3a), then all the language learner has to do upon hearing both diphthongs in Spanish is to conclude that both structures exist. If, on the other hand, there is a principle ruling out more than one diphthong type, and both types of diphthongs appear to exist in the language, then the language learner must figure out which one is present in the underlying representation and how the other one is derived.

Thus, a representation of prevocalic glides that is consistent with the facts available to the learner could facilitate the acquisition process without making it necessary to posit a constraint that rules out more than one diphthong-type in a language that appears to have both.

Schane (1987) mentions that cross-linguistically prevocalic glides generally count as one mora, while postvocalic glides count as two. In view of this, he proposes the following representations:

- (20)
- | | |
|-----|-----|
| a) | b) |
| V V | V |
| | ^ |
| e i | i e |

(20a), "with its two V slots is a proper representation for a falling diphthong only; a rising diphthong should be represented as in (20b), with a single V slot, a representation that has been proposed also for short diphthongs." (Schane (1987) p. X).

Keeping in mind the representation in (20b) let us reconsider the evidence available to the learner regarding the structure of prevocalic glides (see 19). All of the facts suggest that prevocalic glides must be structured as in (20b). Regarding (19a), since rising diphthongs consist of a single V slot they will not attract stress in word-final position. A representation such as (20b) also predicts that the incorporation of an additional segment following the vowel will be possible if CVC syllables are possible, since the number of elements in the skeletal tier will not be affected by the presence of a prevocalic glide. Finally, the lack of co-occurrence restrictions between the onset and prevocalic glides confirms the hypothesis that

the glides must be in the rhyme of the syllable in which they appear. Thus, all the available evidence suggests that prevocalic glides have a structure like (20b). However, the fact that prevocalic glides in the penultimate syllable of a word block antepenultimate stress argues against the hypothesis that a structure like (20b) might be part of the underlying inventory of diphthong types. Unfortunately, this last piece of evidence which is crucial for arriving at the correct representation of prevocalic glides is not available to the learner since it constitutes negative evidence. In other words, all the available evidence regarding the structure of prevocalic glides should lead the language learner to make the incorrect hypothesis that prevocalic glides have a structure like (20b). One crucial piece of evidence suggests however, that this is not right. If prevocalic glides had a structure like (20b) then antepenultimate stress would not be blocked in words having a rising diphthong in the penultimate syllable. Unfortunately, this last piece of evidence is not available to the learner because it relies on the absence of evidence.

Consequently, if we start out with the assumption that both types of diphthongs are possible in Spanish and try to arrive at a representation of prevocalic glides, the facts will incorrectly point in the direction of a representation like (20b). The only way to make sure that a structure like (20b) will not be hypothesized as a possible diphthong-type of Spanish is to include a stipulation in the grammar that rules out the possibility of having both rising and falling diphthongs in the same language. This way, as soon as the existence of falling diphthongs is ascertained rising diphthongs are necessarily analyzed as derived.

To summarize, we have argued in this section that a theory of phonology which rules out more than one diphthong-type in a language is a necessity in accounting for acquisition. A structure like (3a) poses serious problems for acquisition because none of the facts available to the language learner lead to the conclusion that they should be assigned a representation like (3a). The evidence presented in (19) suggests that prevocalic glides have a structure like (20b). However, such a representation is untenable as an underlying structure as evidenced by the fact that prevocalic glides in the penultimate syllable of a word block antepenultimate stress. The only way to make sure then, that (20b) will not be construed as an underlying representation of prevocalic glides is to rule out the possibility of having more than one type of diphthong in a language like Spanish.

Thus, the representation of diphthongs defended in section II is not only to be preferred over previous analyses because it accounts for facts that such analyses leave unexplained, but also because it allows for acquisition to proceed correctly.

One final point regarding the representation in (20a) must be made before concluding this section. Nothing in the analysis presented in section II rules out a structure like (17a) from being derived via a contraction rule. It is possible that a rule of contraction could derive such a structure from a sequence of a [+high] segment and a vowel. What is crucial to our analysis is that such a structure cannot be part of the underlying inventory of syllable types in Spanish.

IV. SUMMARY OF OTHER ISSUES

As we have previously mentioned, one important issue that remains to be investigated is the position of prevocalic glides after Contraction (9). Several possibilities suggest themselves:

A) Contraction could place the [+high, -cons] segment in onset position as in:

p i . a . n o	>	p i a . n o
x x x x x		x x x x x
O R R O R		O R O R

B) Another available option is to syllabify the glide into the following rhyme as in

p i . a . n o	>	p i a . n o
x x x x x		x x x x x
O R R O R		O R O R

C) A third possibility is to eliminate the skeletal slot associated with the glide and to allow the floating features to link to the skeletal slot of the following vowel:

p i . a . n o	>	p i a . n o
x x x x x		x x x x x
O R R O R		O R O R

The first possibility is suggested by the existence of syllables with complex onsets that fail to undergo Contraction. The contrast between the two-syllable sequences in 21a) and the rising diphthongs in 21b) suggests that the complex onset might be blocking the application of Contraction in the first set of examples. Crucially, we could explain why Contraction fails to apply

in the first set of words by invoking a principle that rules out more than two segments in the onset. If Contraction incorporates the [+high, -cons] segment in onset position, it follows that the presence of two elements in the onset will block the incorporation of an additional one.

- | | | |
|------|------------|------------|
| (21) | a. | b. |
| | cri.ó.llo | kyós.ko |
| | cli.én.te | ca.lyén.te |
| | fri.al.dád | fyél |
| | cri.án.za | pa.ryén.te |

However, there are a number words in Spanish that have syllables with complex onsets and rising diphthongs:

- (22) plyé.ge, trwé.no, pryé.to, fryé.go, gryé.go,
trwé.ke

At first glance, these items argue against the claim that certain restrictions hold between onsets and prevocalic glides. Moreover, the examples in 22) raise the question of why Contraction fails to apply in 21a). That is, if there are no constraints keeping the prevocalic glides in 22) from being incorporated into onsets that already have two elements, there is no reason why Contraction shouldn't apply to the forms in 21a).

Closer inspection reveals however, that the set of lexical items that have tautosyllabic sequences of a rising diphthong and a complex onset is largely composed of words that exhibit the V/GV alternation we have discussed before:

- (23)
- | | |
|------------------------|------------------------------|
| plyé.ge / plegár | trwé.no / tronár |
| "fold" (N) / "to fold" | "thunder" (N) / "to thunder" |
| pryé.to / apretár | fryé.go / fregár |
| "dark" / "to tighten" | "I scrub" / "to scrub" |
| gryé.go / Grécya | trwé.ke / trocár |
| "Greek" / "Greece" | "change" (N) / "to change" |

While we will not pursue here a study of the properties of lexical items with complex onsets and prevocalic glides, the facts in 22) suggest that diphthongs arising from Contraction cannot be preceded by a complex onset while those that alternate are subject to no co-occurrence restrictions with the onset.⁴ In view of these considerations, let us assume that contracted forms have a structure such as that proposed under (A). With this we explain why Contraction fails to apply to the forms

in 21) which have a complex onset. Alternating forms have the prevocalic glide in nuclear position as in (B) or (C). Since the [+high, -cons] segment in the alternating forms is not in onset position, it follows that there will be no co-occurrence restrictions between the onset and the glide. The details of the structure of alternating diphthongs is an issue that warrants further investigation.

Another important issue that remains to be investigated is the stress properties of syllable-initial glides. Onset glides in the final syllable of a word always block antepenultimate stress (*pa.pa.ya). In the penultimate syllable however, they allow stress to appear in the preceding syllable (ie. con#yu.ge, Sa.ya.go). The fact that antepenultimate stress is possible in words with a glide-initial syllable in penultimate position confirms that the glide is not in nuclear position. If it were, it would cause the penultimate syllable to have a branching rhyme and block stress. However, if we assume that the syllable-initial [y] is strictly in onset position, we have no way of explaining why antepenultimate stress is impossible for words like papáya since no other onset consonant in the same position blocks antepenultimate stress (ie. nú.me.ro, sá.ba.na, Có.r.do.ba...) .5

The answer to this problem requires an indepth look at certain aspects of Spanish phonology that are beyond the scope of this paper. One possible solution that merits further study consists in allowing the syllable-initial glide to be an ambisyllabic consonant. This is represented below:

(21) p a p a y a
 x x x x x x
 O R O R O R

According to this analysis, onset glides in the final syllable of a word block antepenultimate stress because they cause the penultimate syllable to have a branching rhyme. Onset glides in the penultimate syllable do not block antepenultimate stress because they do not affect the size of the penultimate rhyme. With this we explain the stress properties of onset glides. The consequences of this solution remain a topic of investigation.

Other issues that merit attention include the syllabification differences between [y] and [w] and the representation of postvocalic glides. Steriade (1984) argues that there are some important differences in Romanian between [y] and [w]. In Spanish there also appear to be some differences in how these consonants should be

specified underlyingly. Finally, certain properties of postvocalic glides suggest that at least some falling diphthongs can be derived via a rule of contraction. If this turns out to be possible it will represent a further step in simplifying the inventory of syllable-types in Spanish. This is a desirable outcome from the point of view of learnability.

CONCLUSION

We have presented an analysis of the syllabification properties of [+high, -cons] segments in Spanish that derives all rising diphthongs from a sequence of an unstressed high vowel followed by an onsetless syllable. This analysis accounts for the stress properties of rising diphthongs in the final syllable of a word. In this, it represents an improvement over previous analyses.

The solution presented here is also desirable from the point of view of acquisition. We have shown that previous representations of rising diphthongs are difficult, if not impossible to learn given the data available to the language learner. By eliminating rising diphthongs from the inventory of syllable-types in Spanish we simplify the acquisition process and eliminate the problems of negative evidence in previous analyses. In all these things we have come a step closer to a theory of phonology that solves the logical problem of language acquisition.

NOTES

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¹ I will use orthographic form throughout this paper, except in the following cases:

- a) [+high, -cons] segments that are unspecified for the feature syllabic or that are assigned syllabic status in the course of a derivation will be represented as [i]/[u]. [+high, -cons] segments that are specified as [-syll] or that are assigned glide status during the course of syllabification will be denoted by [y]/[w].

- b) Stress will be marked only in the relevant cases and not in conformance to orthographic conventions.
- c) The sound /h/ (or /x/ in Castilian dialects) will be represented by its phonetic symbol rather than by its orthographic form (-j).

² There are a few lexical items in Spanish that contain a postvocalic glide followed by a tautosyllabic consonant (ie. veyn.te "twenty", seys "six", caws.ti.co "caustic"). However, following Harris (1983), I have decided to consider these marginal examples that do not represent productive syllable templates.

³ See Schane (1987) on the resolution of hiatus in Spanish.

⁴ This appears to be the case for the large majority of words that have a complex onset followed by a [+high, -cons] segment. However, only an exhaustive survey of the Spanish lexicon will reveal whether this observation is true.

⁵ This is not entirely correct, palatal consonants and the trilled [r] block antepenultimate stress when in the final syllable of a word. However, there is reason to think that these consonants are complex segments (see Carreira (1988)).

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TONOLOGY OF NOUN-MODIFIER PHRASES IN JITA*

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In Jita, some noun-modifier phrases have one more high tone than occurs on the noun and modifier in isolation. In this paper, I first discuss the tone patterns of nouns and show how the additional high tone of noun-modifier phrases may be accounted for by a rule inserting a high tone on the final syllable of a noun which precedes a modifier phrase. Secondly, I discuss problems in formulating the high tone insertion rule, and conclude that it must refer to "N' modifier phrase" as the trigger for high tone insertion to correctly account for all the data.

0. INTRODUCTION

Jita is a Lacustrine Bantu language of Tanzania (Guthrie's Zone E Group 20), and my paper is based on the speech of F. T. Magayane, a native speaker of Jita from the island of Ukerewe. Jita has received almost no treatment, either descriptive or analytical, in the literature. However, as argued in Massamba (1977), it is closely related to Ruri, a language whose tonal phonology has been the subject of some study, notably Massamba's (1982) Ph.D. dissertation and a series of articles by Goldsmith (1982, 1984, 1986), based on his work with Massamba.

Massamba (1982) noted an unusual tone pattern in noun-adjective phrases in Ruri, namely, the presence of a high tone on the first syllable (after vowel coalescence) of the adjective in contexts where the source of the high tone could not be the preceding noun. For example, the Ruri noun-adjective phrases below (Massamba (1982), p 206) have one more high tone than is found on the words in isolation, so that the tone pattern of the adjective following a low noun is identical to that following a high noun:

- (1a) omu gási 'wife' omu jómu 'good'
 omugásu:mújómu 'good wife'
(1b) omu sa:ni 'friend' omu jómu 'good'
 omusa:nu:mújómu 'good friend'

Thus, an underlying high tone on the preceding noun does not seem to contribute the additional high tone of the adjective. Instead, Massamba accounted for it by a rule inserting a phrasal accent, which was associated with the last syllable of a noun followed by an adjective.

In this paper I will show that in Jita noun-modifier phrases, the first syllable of the modifier (after vowel coalescence, if applicable) likewise has a high tone if the preceding noun is low-toned (2a). No additional high tone appears, however, on modifiers following nouns with a high tone on the penult (penult-high nouns, (2b)); nor when the noun has a high tone on the final syllable (final-high nouns; (2c)). In fact, low nouns and final-high nouns neutralize in noun-modifier phrases, as can be seen by comparing (2a) with (2c):

- | | | |
|------|---|------------------|
| (2a) | <u>Low Noun</u>
ama Bui 'stones'
amaBui másito 'heavy stones' | ama sito 'heavy' |
| (2b) | <u>Penult-High Noun</u>
omu jígo 'load'
omujigó musito 'heavy load' | omu sito 'heavy' |
| (2c) | <u>Final-High Noun</u>
li tí 'log'
liti lísito 'heavy log' | li sito 'heavy' |

(The falling contour which occurs in final-high nouns phrase-finally is derived by a rule which will be discussed in the next section.)

Using a non-accentual approach, I analyze these tone patterns as resulting from a rule of Noun Phrase High Insertion, which inserts a high tone on the final syllable of a noun when it is followed by a modifier. The inserted high tone associated with the final syllable of the noun is then either deleted or it spreads rightward one syllable and the left branch delinks by rules which apply quite generally in Jita.

Although this analysis resembles in some respects that proposed by Massamba (1982) for the analogous facts in Ruri, I will show that the inserted high tone occurs in noun-modifier phrases not discussed by Massamba or for which he gave a different analysis. Further, I will argue that in Jita the inserted high tone must associate with the final syllable of the noun and not the first syllable of the modifier, while Massamba claims this choice is arbitrary for Ruri. Finally, I will discuss difficulties encountered in formalizing the domain of Noun Phrase High Insertion.

1. TONE PATTERNS OF NOUNS AND BASIC TONE RULES OF JITA

Before presenting an analysis of the tone patterns of Jita noun-modifier phrases, I will briefly discuss the possible underlying tone patterns of nouns and the rules which derive their surface tone patterns phrase-finally. Like many other Eastern Bantu languages - such as Digo (Kisseberth (1984)), Ganda (Stevick (1969)), Haya (Hyman and Byarushengo (1984)) and Ruri (Goldsmith (1986)), to name a few - Jita only has high tones underlyingly, with most surface lows inserted by a post-lexical default rule. In the lexical representations of nouns, it is necessary to specify if there is a high tone and the syllable to which it is linked. Thus, the three main surface tone patterns found in noun stems of two syllables may be characterized as follows (nouns have the structure (pre-prefix+) class prefix + stem):

- (3a) \emptyset tone: o+mu+sa:ni 'friend'
 (3b) initial- (penult-) high: o+mu+gási 'woman'
 (3c) final-high: o+mu+tu:ngâ 'rich person'

Although I claim that the noun in (3c) has a high tone linked with the final syllable underlyingly, it surfaces in phrase-final position with a falling contour. In phrase-medial position, however, the final syllable of a final-high noun is low and the next syllable rightward is high-toned, as shown by the data below:

- (4a) omu tu:ngâ 'rich person' mumúji 'in town'
 omutu:ngâ múmúji 'rich person in the town'
 (4b) eci minâ 'scorpion' kumaBui 'by the rocks'
 ecimina kúmaBui 'scorpion by the rocks'
 (4c) i:ndarâ 'leopard' ya:Bilima 'it ran'
 i:ndara yá:Bilima 'the leopard ran'

The high tone on the final syllable of the noun seems to have shifted one syllable rightward in these phrases. If the high-low (falling) contour on the final syllable were underlying, however, one would expect the low tone to block rightward shift of the high tone. Since this does not occur nor does a low tone manifest itself in any other way when final-high words are in phrase-medial position, I conclude that the falling contour tone is derived from an underlying level high tone on a final syllable. Following Kisseberth's (1984) analysis of a similar phenomenon in Digo, I account for this by a rule which inserts a low tone phrase-finally. This low tone links to the final syllable of the phrase, deriving a falling contour when that syllable is associated with a high tone. The rules of Phrase-Final Lowering and Contour Creation are given below:

(5) Phrase-Final Lowering

$$\emptyset \text{ ---} \rightarrow \text{L} / \text{ ___ } \text{]phrase}$$

(6) Contour Creation

$$\begin{array}{c} \text{H} \quad \text{L} \\ | \quad \cdot \\ \cdot \cdot \cdot \\ 6 \text{]phrase} \end{array}$$

Turning to three-syllable stems, the following surface patterns occur:

- (7a) \emptyset tone: o+mu+lamusi 'judge'
 (7b) penult-high: ji+ngokóla 'knees'
 li+nanáji 'pineapple'
 (7c) final-high: li+darinā 'tangerine'

Theoretically, three-syllable noun stems would be expected to have at least four tone patterns - \emptyset tone, initial-high, penult-high and final-high - but the initial-high pattern does not surface. Phrase-medially, however, three-syllable penult-high nouns show two different tone patterns. To illustrate, in phrases (8a) and (8b) below, the penult high tone has shifted to the final syllable, but in phrases (8c) and (8d) the high tone remains on the penult:

- (8a) li nanáji 'pineapple' lya:malí:Bwa 'was eaten'
 linanají lya:malí:Bwa 'the pineapple was eaten'
 (8b) i: Bustáni 'garden' mumúji 'in town'
 i:Bustaní mumúji 'the garden in town'
 (8c) i: ngokóla 'knee' ya:maú:ta:ra 'was hurt'
 i:ngokóla ya:maú:ta:ra 'the knee was hurt'
 (8d) eBi tu:ngúru 'onions' mucikápo 'in the basket'
 eBitu:ngúru mucikápo 'the onions in the basket'

The phrases below show that when two-syllable penult-high nouns appear in phrase-medial position, their high tones also shift to the final syllable:

- (9a) omu némbe 'mango tree' gwa:témwa 'was cut'
 omuñembé gwa:témwa 'the mango tree was cut'
 (9b) aBa lé:la 'tall people' kumulyango 'by the door'
 aBale:lá kumulyango 'tall people by the door'
 (9c) i: n jóki 'bee' kuBwa:syo 'on the flowers'
 i:njóki kuBwa:syo 'the bee on the flowers'

Thus, three-syllable penult-high nouns like those in (8a) and (8b) show the same phrase-medial tonal behavior - namely, a shift of their high tone from the penult to the final syllable - as two-syllable penult-high nouns. What remains to be explained is why the penult high tone of the nouns in (8c) and (8d) does not shift in phrase-medial position.

A similar problem arises in the tone pattern of infinitives in Jita (oku- is the infinitive prefix). Two-syllable high verb stems always have a high tone on the stem-initial (or penult) syllable in phrase-final position. This penult high tone shifts to the final syllable when the infinitive is in phrase-medial position, just as it does in two-syllable penult-high nouns (compare the data below with that in (9)):

(10a) oku í:ga 'to look for' ji: n dóBo 'buckets'
okui:gá ji:ndóBo 'to look for buckets'

(10b) oku Bóna 'to see; get' i: ñoni 'bird'
okuBoná i:ñoni 'to see/get a bird'

Three-syllable high verb stems have a high tone on the second stem syllable (or penult) in phrase-final position, but their penult high tone never shifts, just like that of the three-syllable nouns in (8c) and (8d):

(11a) oku kará:nga 'to fry' ji: n swi 'fish'
okukará:nga ji:nswi 'to fry fish'

(11b) oku Bagála 'to weed' i: Bustáni 'garden'
okuBagála i:Bustáni 'to weed the garden'

Tone shift also occurs in other environments in infinitives. As noted above, two-syllable high stems have a high tone on the initial, or penult, syllable. However, when derivational suffixes are added to these stems, the high tone shifts to the second stem syllable if the derived stem has three syllables or more, as illustrated below:

(12a) oku Bón-a 'to get; see'
(12b) oku Bon-án-a 'get/see each other'
(12c) oku Bon-ér-a 'to get something for someone'
(12d) oku Bon-ér-an-a 'to get something for each other'

(13a) oku í:g-a 'to look for'
(13b) oku i:g-án-a 'to look for each other'
(13c) oku i:g-ír-a 'to look for something for someone'
(13d) oku i:g-ír-an-a 'to look for s.t. for ea. other'

Toneless stems remain toneless when the suffixes are added to them, as shown below:

- (14a) oku Bum-a 'to hit'
 (14b) oku Bum-an-a 'to hit each other'
 (14c) oku Bum-ir-a 'to hit for someone'
 (14d) oku Bum-ir-an-a 'to hit for each other'
- (14e) oku gur-a 'to buy something'
 (14f) oku gur-ir-a 'to buy something for someone'
 (14g) oku gur-ir-an-a 'to buy s.t. for each other'

Thus, these suffixes must be toneless underlyingly, and the high tone on the second syllable of the derived high stems in (12) and (13) must be derived by the stem high tone shifting one syllable to the right.

The derived three-syllable verb stems in (12b) and (12c) and (13b) and (13c) have a high tone on the penult after tone shift. Unlike the underlying penult high tone on the two-syllable stems, the derived penult high tone will not shift phrase-medially, as shown below (compare these examples with (10a) and (10b), above):

- (15a) oku Bon-ér-a 'to get something for someone'
 li gé:mbe 'plow
 okuBonéra lige:mbe 'to get a plow for someone'
- (15b) oku Bon-án-a 'to see each other'
 kusú:le 'at school'
 okuBonána kusú:le 'to see each other at school'
- (15c) oku i:g-ír-a 'to look for s.t. for someone'
 i: n sikiri 'donkey'
 okui:gíra i:nsikiri 'to look for a donkey for someone'
- (15d) oku i:g-án-a 'to look for each other'
 kusú:le 'at school'
 okui:gána kusú:le 'to look for each other at school'

Another context in which tone shift occurs in infinitives is in low infinitives with one object marker (OM). All OM's are high-toned in Jita (except the first person singular) and immediately precede the verb stem. When they are prefixed to low verb stems, their high tone shifts one syllable to the right of the OM (i.e., to the first stem syllable), except when the OM is the penult. This is illustrated in the examples below (the OM's are underlined):

- (16a) oku sy-a 'to grind'
 (16b) oku í-sy-a 'to grind it (Class 9)'

- (16c) oku Bum-a 'to hit'
 (16d) oku mu-Búm-a 'to hit him'
 (16e) oku mu-Búm-ir-a 'to hit for him'
- (16f) oku gur-a 'to buy'
 (16g) oku ci-gúr-a 'to buy it (Class 7)'
 (16h) oku ci-gúr-ir-a 'to buy it (Cl. 7) for someone'

The low infinitives in (16d) and (16g) come to have a high tone on the penult after tone shift. Unlike the underlying penult high tone on the OM in (16b), the derived penult high tone will not shift phrase-medially, as shown below (compare (17a) with (17b), (17c)):

- (17a) oku í-sy-a 'to grind it (Cl. 9)'
 kumugera 'by the river'
 okui:syá kumugera 'to grind it by the river'
- (17b) oku mu-Búm-a 'to hit him' munô 'alot'
 okumuBúma munô 'to hit him alot'
- (17c) oku ci-gúr-a 'to buy it (Cl. 7) le:lô 'today'
 okucigúra le:lô 'to buy it today'

The data in (9), (10) and (17a) show that surface penult high tones which are underlyingly associated with the penult will shift one syllable to the right in phrase-medial position. Surface penult high tones which are underlyingly associated with the antepenult, as in (15), (17b) and (17c), will not shift in phrase-medial position, however. Thus, I conclude that the surface penult high tones of the nouns in (8a) and (8b) which shift to the final syllable in phrase-medial position are underlyingly associated with the penult. By contrast, the surface penult high tones of the nouns in (8c) and (8d) and the verbs in (11) which do not shift rightwards in phrase-medial position are underlyingly associated with the antepenult, or stem-initial syllable, and have shifted rightward onto the penult.

Underlyingly, then, three-syllable noun stems do have four possible tone patterns - namely, all-low, initial-high, penult-high and final-high. The initial-high will always be neutralized with the penult-high in phrase-final position, however, due to tone shift. Only in phrase-medial position will underlyingly initial-high and penult-high three-syllable noun stems contrast, since only underlying penult high tones will shift to the final syllable.

This process of tone shift may be accounted for by rules which spread the high tone one syllable rightward and then delink the left branch of the derived doubly-linked high, as formulated below:

(18) Rightward Spread (RS)



(19) Leftward Delinking (Delink)



RS and Delink are phrase-level, or post-lexical, rules, because they apply not only across both morpheme and word boundaries but also within stems. This context-free, across-the-board application results in absolute neutralization of the underlying tone pattern in stems of three syllables or more with a pre-penult high tone. Further, RS and Delink must be ordered before the post-lexical default rule inserting low tones, since RS does not create contour tones or downstep, nor do low tones interact in any other way with RS which might indicate that low tones were specified when RS applies.

The derivations of (8b) and (8d) below illustrate how the correct phrase-medial tone patterns of three-syllable penult-high nouns may be predicted, if we postulate that before RS and Delink apply the high tone is underlyingly associated with the penult in nouns with "shifting" penult high tones like i:Bustaní 'garden' (20), but with the initial syllable (antepenult) in nouns with "non-shifting" penult high tones like eBitu:ngúru 'onions' (21):

(20) Derivation of (8b)
i:Bustaní mumúji 'garden in town'

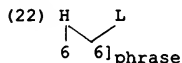
		H		H
UR	i:Bustani		mumuji	
	garden		in the town	
		H		H
		\		?
RS & Delink	i:Bustani		mumuji	
SR	i:Bustaní mumúji			

- (21) Derivation of (8d)
eBitu:ngúru mucikápo 'onions in the basket'

	H		H
UR		eBitu:nguru	
		onions	mucikapo
			in the basket
RS & Delink	H	eBitu:nguru	H ?
SR		eBitu:ngúru	mucikápo

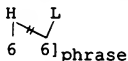
I have not yet accounted for the fact that a high tone underlyingly associated with the penult does not spread when a word is in phrase-final position, as in mumúji and mucikápo in (20) and (21), respectively. There are two possible ways of analyzing this condition on RS. The first possibility is that final syllables are extratonal at the phrase level, but not extratonal for lexical tonal association. Since RS is a phrase-level rule, there would thus be no available rightward syllable for the penult high tone to spread to when RS applies.

The second possibility is that the high tone does spread to the final syllable. Then, before Delink applies, Phrase-Final Lowering (5) and Contour Creation (6) apply to derive the following configuration:



A rule of contour simplification would then have to apply to delink the high tone of a falling contour, when that high tone is multiply-linked:

- (23) Contour Simplification



As illustrated in the derivations below, both of these solutions correctly allow spread from the penult to a word-final syllable when a word is in phrase-medial position, but block or undo spread from the penult to the final syllable when a word is in phrase-final position:

(24a) Extratoneality analysis, derivation of (8b):
i:Bustáni mumúji 'garden in town'

	H	H
UR		
	i:Bustani	mumuji
	garden	in the town
	H	H
RS &		
Delink	i:Bustáni	mumu(ji) _{ex}
SR	i:Bustáni mumúji	

(24b) Contour Simplification analysis, derivation of
 (8b): i:Bustáni mumúji 'garden in town'

	H	H
UR		
	i:Bustani	mumuji
	garden	in the town
	H	H
RS		
	i:Bustáni	mumuji
	H	H L
Final		
Low	i:Bustáni	mumuji]phrase
	H	H L
Contour		
Creation	i:Bustáni	mumuji]phrase
	H	H L
Contour		
Simplif.	i:Bustáni	mumuji
	H	H L
Delink		
	i:Bustáni	mumuji
SR	i:Bustáni mumúji	

In the Extratoneality analysis (24a), only phrase-final syllables are extratoneal. Thus, a high tone may spread from the penult to the final syllable of i:Bustáni, which is non-final in the phrase, but the high tone on the penult of mumúji may not spread since the following syllable is phrase-final and thus extratoneal. In the Contour Simplification analysis (24b), lows are only introduced phrase-finally. Thus, while the high tones of both i:Bustáni and mumúji spread, Final Lowering and Contour

Creation may apply only to mumúji. Contour Simplification will then apply to mumúji, undoing spread, while Delink will apply to i:Bustáni, deriving tone shift. I have found no evidence so far in favor of one of these hypotheses over the other, so I shall arbitrarily adopt the extratone solution in this paper.

With this background on the underlying tone patterns of nouns and the basic tone rules of Jita in mind, I will now turn to the problem of high tone insertion in noun-modifier phrases. Before presenting my analysis of the tone patterns in Jita noun-modifier phrases, however, I will sketch Massamba's (1982) account of analogous facts in Ruri, a language closely related to Jita.

2. TONE IN RURI NOUN-MODIFIER PHRASES

David Massamba's (1982) Ph.D. dissertation on Ruri tonology concentrates on analyzing tone in isolated words, mainly verb forms, using an accentual approach. In his analysis, the basic tone melody of Ruri is LHL, and the accent is associated with the first low tone. Every surface high tone is the result of an underlying accent. The LHL melody, like my rule of RS, accounts for the fact that in Ruri, as in Jita, a high tone usually surfaces one syllable to the right of the one which underlyingly contributes the high tone. Since there are no rules of tone spread in this framework, surface tone patterns are derived by rules referring to accent placement.

Massamba (1982) discussed Ruri noun-adjective phrases in some detail in the final chapter of his dissertation, and noted three different tonal alternations. The first alternation occurs when the noun has a high tone on a short penult syllable which lengthens phrase-medially:

- (25) omw aána 'child' omu jómu 'good'
 omwa:nó:mujómu 'good child'

The second alternation occurs when the noun has a high tone on a short penult syllable:

- (26) omu gási 'wife' omujómu 'good'
 omugásu:mújómu 'good wife'


The third alternation occurs when the noun is all low:

- (27) omu sa:ni 'friend' omu jómu 'good'
 omusa:nu:mújómu 'good friend'

(Massamba gives no examples of phrases with nouns having a high tone - or accent, in his analysis - on the final syllable.)

In (26) and (27) above, the phrases have one more high tone than the noun and adjective do in isolation, namely, the first syllable (after vowel coalescence) of the adjective has become high-toned. Since in Massamba's analysis each high tone is the result of an accent on the preceding syllable, he accounted for this data with a rule of Noun-Adjective Juxtaposition inserting an accent on the final vowel of the noun. He claimed that associating the accent with the final vowel of the noun rather than the first vowel (pre-prefix) of the adjective was an arbitrary decision, however, since the two become tautosyllabic after vowel coalescence. To account for the absence of an additional high tone in phrases like (25), Massamba proposed a rule of FV Accent Back Hopping to fuse the accent introduced by Noun-Adjective Juxtaposition with the accent on the noun stem:

(28) FV Accent Back Hopping (p. 207, no. 14.iv.)


 V V + V #

Massamba (1982) also discussed two other types of noun-modifier phrases, namely, noun-demonstrative phrases and noun-possessive phrases. Demonstratives all have a low tone on their first syllable in isolation, but in noun-demonstrative phrases the first syllable of demonstratives is always high-toned, as illustrated below (from Table 7a, p. 219):

- (29a) aBa ána 'children' Banu 'these'
 aBa:ná Bánu 'these children'
- (29b) omu rúme 'man' unu 'this'
 omurúme únu 'this man'
- (29c) eci Buyû 'gourd' cinu 'this'
 eciBuyu cínu 'this gourd'
- (29d) emi simu 'arrows' jinu 'these'
 emisimu jínu 'these arrows'

Massamba concluded that these phrases have an additional high tone due to the same process involved in noun-adjective phrases, that is, by a rule which inserts an accent on the final vowel of the noun. Apparently FV Accent Back Hopping does not apply to noun-demonstrative phrases, however, since there is an additional high tone on the demonstrative after high nouns with a penult vowel which lengthens phrase-medially, like "aBaána," whereas there was no additional high on adjectives following these nouns (see 25). Massamba (1982) does not comment on this, however, nor does he give derivations.

Noun-possessive phrases do not seem to follow the pattern of having an accent inserted on the final vowel of the noun. Ruri possessive pronouns have a high tone on the penult in isolation, which Massamba analyzed as resulting from an accent on the preceding (initial) syllable. In noun-possessive phrases, however, the possessive usually has a high tone on the initial syllable, as illustrated below (from p. 212, no. 20):

- (30a) omu gási 'wife' waáni 'my'
 omugási wáani 'my wife'
- (30b) omu sa:ni 'friend' waáni 'my'
 omusa:ni wáani 'my friend'
- (30c) omw aána 'child' waáni 'my'
 omwa:ná waáni 'my child'
- (30d) eci Buyú 'gourd' caáni 'my'
 eciBuyu cáani 'my gourd'

Massamba concluded that the accent on the initial syllable of the possessive hops backwards one syllable to the final syllable of the noun in these phrases, unless the penult or final syllable of the noun is already accented.

Thus, in Massamba's (1982) discussion of noun-modifier phrases in Ruri, he finds no unifying principle for analyzing their tone patterns. While both noun-adjective and noun-demonstrative phrases acquire an additional high tone on the modifier by a rule of accent insertion, only noun-adjective phrases require the rule of FV Back Hopping. Noun-possessive phrases, on the other hand, show no evidence of an additional high tone. Rather, in certain cases the accent on the first vowel of the possessive will hop back to the final vowel of the noun.

Although Jita and Ruri are closely related languages, and both do have a rule inserting a high tone in noun-modifier phrases, in the next section I will show that the inserted high tone surfaces in different tonal contexts in Jita from in Ruri. Further, I will show that the inserted high tone occurs in a much wider range of noun-modifier contexts in Jita than Massamba presents for Ruri. In fact, in Jita a high tone is inserted before any nominal modifier (the definition of "modifier" will be discussed in Section F, below). Finally, I will argue that in Jita the inserted high tone necessarily - not arbitrarily, as Massamba claimed for Ruri - associates with the final syllable of the noun, not the initial syllable of the modifier.

3. JITA NOUN-MODIFIER PHRASES

3.1 NOUN-ADJECTIVE PHRASES

As we have seen in the preceding section, in Ruri noun-adjective phrases an additional high tone appears after both all-low nouns and high nouns with a short (phrase-medially) penult syllable. In Jita, an additional high tone also appears in noun-adjective phrases, but in different tonal contexts from in Ruri. As is illustrated in (31), in Jita the additional high tone surfaces only after nouns which are either all low (31a) or which have a high tone underlyingly on a pre-penultimate syllable ("non-shifting" or pre-penult high; (31b)). After nouns with an high tone underlyingly on the penult (penult-high; (31c)) or final syllable (final-high; (31d)), there is no additional high tone, so that the contrast between all-low nouns and final-high nouns is lost in noun-adjective phrases (compare (31a) and (31d)):

Low Nouns

(31a) ama Bui 'stones' ama sito 'heavy'
amaBui másito 'heavy stones'

(31b) eBi Bira 'forests' eBi néne 'big'
eBiBira Bínéne 'big forests'

Pre-Penult High Nouns

(31c) eBi tu:ngúru 'onions' eBi sito 'heavy'
eBitu:ngúrw eBísito 'heavy onions'

(31d) i: ngokóla 'knee' i: néne 'fat; big'
i:ngokóla í:néne 'fat knee'

Penult-High Nouns

(31e) omu jígo 'load' omu sito 'heavy'
omujigó musito 'heavy load'

(31f) olu góye 'rope' olu lé:la 'long'
olugoyé lulé:la 'long rope'

Final-High Nouns

(31g) li tí 'log' li sito 'heavy'
liti lísito 'heavy log'

(31h) omw o:ngô 'nose' omu néne 'big'
omwo:ngo múnéne 'big nose'

To account for the additional high tone in noun-adjective phrases like (31a), (31b), (31c) and (31d), I propose a rule of Noun-Phrase High Insertion, which inserts a high tone on the final syllable of a noun when it is followed by a modifier within N'', as formulated below:

(32) Noun-Phrase High Insertion, version 1 (NPHI1)

$$6 \text{ -->} 6 / \left[\left[\dots ___\right]_N \left[6 \dots \right]_{\text{modif}} \right]_N'$$

(This rule is essentially a non-accentual version of Massamba's (1982) Noun-Adjective Juxtaposition rule.) Vowel Coalescence may then apply to delete the first (pre-prefixal) vowel of the adjective. Finally, Rightward Spread (RS) and Leftward Delinking (Delink; (18) and (19), above) apply, resulting in a high tone on the prefix of the adjective, as illustrated in the derivation of (31a), below:

(33) Derivation of (31a): amaBui másito 'heavy stones'

UR	[ama Bui] _N	[ama sito] _{modif}
	stones	heavy
		H
	⋮	
NPHI1	ama Bui	ama sito
		H
	⋮	
Vowel Coal	ama Bui	ma sito
		H
	⋮	
RS & Delink	ama Bui	ma sito
		H
	⋮	
SR	amaBui	másito 'heavy stones'

Note that RS and Delink are crucially ordered after Vowel Coalescence. This is because Vowel Coalescence collapses the final vowel of the noun and the initial short vowel of the following modifier into a single syllable, then deletes the second vowel or glides the first vowel of the collapsed syllable. It is from this collapsed syllable that RS spreads the high tone one syllable rightward, as shown in (33), above. If Vowel Coalescence applied after RS and Delink, the high tone on the final vowel of the noun could only spread to the initial vowel of the modifier. Then when these two vowels are collapsed into a single syllable by Vowel Coalescence, the effect of tone shift would be lost, as illustrated below:

- (34) Derivation of (31a): amaBui másito 'heavy stones':
Vowel Coalescence ordered before RS and Delink

UR	[ama Bui] _N	[ama sito] _{modif}
	stones	heavy
	H ⋮	
NPHI1	ama Bui	ama sito
	H †	
RS & Delink	ama Bui	ama sito
	H 	
Vowel Coal	ama Bui	ma sito
SR	*amaBuí masito 'heavy stones'	

A high tone is inserted in all noun-adjective phrases, but no additional high tone surfaces in final-high noun phrases, because the Twin Sister Principle will delete one of the two high tones associated with the final syllable of the noun after NPHI1. This is illustrated in the derivation of (31g), below:

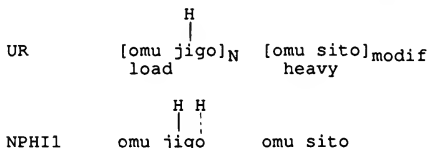
- (35) Derivation of (31g): liti lísito 'heavy log'

UR	[li ti] _N	[li sito] _{modif}
	log	heavy
	H 	
NPHI1	li ti	li sito
	H H †	
Twin Sister	li ti	li sito
Vowel Coal	N/A	
	H †	
RS & Delink	li ti	li sito
SR	liti lísito 'heavy log'	

Thus, all-low and final-high nouns are neutralized in noun-adjective phrases because, when RS applies, both have one high tone on their final syllable.

A different principle, however, is necessary to account for the absence of an additional high tone in phrases with penult-high nouns like (31e), above. The following derivation of (31e) shows that, after NPH11 applies, both the penultimate and final syllables of the noun are associated with a high tone:

(36) Derivation of (31e): omujigó musito 'heavy load'



High tones associated with adjacent syllables meet the structural description of a common rule of Bantu tonology (Goldsmith (1984) known as Meeussen's Rule, which deletes a high tone when it is immediately preceded by another high tone within the same word:

(37) Meeussen's Rule (MR)



It should be pointed out that Meeussen's Rule also applies in other contexts in Jita. For example, when high-toned object markers (OM's) precede a high-toned verb stem, the stem high tone is deleted, neutralizing the contrast between high- and low-toned stems, as shown below (compare these data with those in 16, above):

(38) High Infinitives + 1 OM (OM underlined)

- (a) oku ly-â 'to eat'
 oku Bí-ly-a 'to eat it (Class 8)
- (b) oku Bón-a 'to see'
 oku mu-Bóna 'to see him'
- (c) oku kará:ng-a 'to fry'
 oku ji-kára:ng-a 'to fry them (Class 10)

In noun phrases, Meeussen's Rule applies after NPH11 to delete the inserted high tone associated with the final syllable of the noun when there is also a high tone on the immediately preceding (penultimate) syllable. The derivation of (31e) continues as follows:

(39) Derivation of (31e), continued:

	$\begin{array}{c} H \quad H \\ \quad \\ \text{omu jigo} \end{array}$	omu sito
MR	$\begin{array}{c} H \\ \\ \text{omu jigo} \end{array}$	omu sito
Vowel Coal	$\begin{array}{c} H \\ \\ \text{omu jigo} \end{array}$	musito
RS & Delink	$\begin{array}{c} H \\ \quad \backslash \\ \text{omu jigo} \end{array}$	musito
SR		omujigó musito 'heavy load'

As predicted by my analysis, noun-modifier phrases with three-syllable penult-high nouns (those with a "shifting" penult high tone) have the same tone pattern as two-syllable penult-high noun phrases, namely the inserted high tone does not surface:

(40a) li nanáji 'pineapple' li sito 'heavy'
 linanají lisito 'heavy pineapple'

(40b) i: Bustáni 'garden' i: néne 'big'
 i: Bustaní i: néne 'big garden'

Meeussen's Rule applies to delete the inserted high tone in these phrases, just as it did in the derivation of 31c-omujigó musito 'heavy load'. This is illustrated in the derivation of (40a), below:

(41) Derivation of (40a):
linanají lisito 'heavy pineapple'

UR	$\begin{array}{c} H \\ \\ \text{[li nanaji]}_N \\ \text{pineapple} \end{array}$	[li sito] _{modif} heavy
NPH11	$\begin{array}{c} H \quad H \\ \quad \\ \text{li nanaji} \end{array}$	li sito
MR	$\begin{array}{c} H \\ \\ \text{li nanaji} \end{array}$	li sito

Vowel			
Coal	N/A		
RS & Delink		$\begin{array}{c} \text{H} \\ \\ \text{f} \end{array}$	$\begin{array}{c} \text{H} \\ \\ \text{f} \end{array}$
	li nanaji	li sito	
SR	linanají lisito	'heavy pineapple'	

By contrast, noun modifier phrases with three-syllable initial-high (i.e., pre-penult high) nouns which have "non-shifting" penult high tones retain the inserted high tone, just like all-low nouns do. This is predicted in my analysis, since I claim that the high tone of these nouns is underlyingly on the initial syllable, even though it always surfaces on the penult. Thus, Meeussen's Rule will not apply to delete the inserted high tone in pre-penult high noun phrases, because the underlying pre-penult high tone is not adjacent to the inserted high tone associated with the final syllable of the noun. This is illustrated by the derivation of (31c), below:

- (42) Derivation of (31c):
eBitu:ngúrw eBísito 'heavy onions'

UR	$\begin{array}{c} \text{H} \\ \\ [\text{eBi tu:nguru}]_N \\ \text{onions} \end{array}$	$[\text{eBi sito}]_{\text{modif}}$	heavy
NPH11	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \vdots \\ \text{eBi tu:nguru} \end{array}$	eBi sito	
MR	N/A		
Vowel	$\begin{array}{c} \text{H} \\ \\ \text{eBi tu:ngurw} \end{array}$	$\begin{array}{c} \text{H} \\ \\ \text{eBi sito} \end{array}$	
Coal.	eBi tu:ngurw	eBi sito	
RS & Delink	$\begin{array}{c} \text{H} \\ \\ \text{f} \end{array}$	$\begin{array}{c} \text{H} \\ \\ \text{f} \end{array}$	
	eBi tu:ngurw	eBi sito	
SR	eBitu:ngúrw	eBísito	'heavy onions'

3.2. OTHER NOUN-MODIFIER PHRASES

So far I have only given examples of noun-adjective phrases, but other types of noun-modifier phrases have the same tone patterns. An additional high tone is found on the first syllable of the modifier following low and pre-penult high nouns. Penult-high and final-high noun phrases have no

additional high tone, so that final-high and all-low noun phrases have identical tone patterns. This is illustrated in the noun-demonstrative, noun-possessive, noun-associative phrase and noun-relative clause phrases with each of the four noun types, below (the underlying forms are to the left of the arrow, the surface forms are to the right in these and all following data in this paper):

(43) Noun-Demonstrative Phrases

(a) Low Noun

[li siBa]_N [li lí:ya]_{modif} --> lisiBa lílí:ya
'that well'

(b) Final-High Noun

[ji n swí]_N [ji lí:ya]_{modif} --> jinswi jílí:ya
'those fish'

(c) Penult-High Noun

[otu góye]_N [tu lí:ya]_{modif} --> otugoyé tulí:ya
'that string'

(d) Pre-Penult-High Noun

[emi ñóroro]_N [ji lí:ya]_{modif} --> emiñóróro
jílí:ya 'those chains'

(44) Noun-Possessive Phrases

(a) Low Noun

[omu sa:ni]_N [w aô]_{modif} --> omusa:ni wáô 'your friend'

(b) Final-High Noun

[i ngá]_N [y aô]_{modif} --> inga yáô 'your cow'

(c) Penult-High Noun

[olw ímbo]_N [lw aê]_{modif} --> olwimbó lwaê 'his song'

(d) Pre-Penult High Noun

[eci kárangiro]_N [ci aô]_{modif} --> ecikarángiro cáô
'your frying pan'

(45) Noun-Associative Phrase Phrases

(a) Low Noun

[ji ñoñi]_N [já eci Bira]_{modif} --> jiñoñi
jé cíBira 'birds of the forest'

(b) Final-High Noun

[ji ngá]_N [já aBa lefi]_{modif} --> jinga já Bálefi
'cows of the shepherds'

(c) Penult-High Noun

[ji m bégu]_N [já ama darinâ]_{modif} --> jimbegú
ja mádarinâ 'seeds of the tangerines'

(d) Pre-Penult High Noun

[omu gúrusi]_N [wá eci refu]_{modif} --> omugurúsi
wécírefu 'old man with a beard'

(46) Noun-Relative Clause Phrases

(a) Low Noun

[aBa limi]_N [aBo caaBónâ]_{modif} --> aBalimy aBó
 caaBónâ 'the farmers whom we saw'

(b) Final-High Noun

[omu Bú]_N [ogwo naaBónâ]_{modif} --> omuBw ogwó
 naaBónâ 'the mosquito that I saw'

(c) Penult-High Noun

[aka góye]_N [ako naaBónâ]_{modif} --> akagoy áko
 naaBónâ 'the strings that I saw'

(d) Pre-Penult High Noun

[emi ñóroro]_N [ejo naaBónâ]_{modif} --> emiñorórw
 ejó naaBónâ 'the chains which we saw'

The derivation of the tone patterns in these phrases would be analogous to that of the noun-adjective phrases discussed in the preceding section. A high tone is inserted between the noun and its modifier, and the inserted high tone is linked to the final syllable of the noun. In all-low and pre-penult-high noun phrases, the inserted high remains and spreads one syllable rightward onto the first syllable (after vowel coalescence) of its modifier. The inserted high tone is deleted from final-high and penult-high nouns by the Twin Sister Principle or Meeussen's Rule, respectively. The derivations of the noun-modifier phrases in (43) through (46) would thus proceed exactly like those already given in the preceding section (3.1) for noun-adjective phrases.

Taking a closer look at the noun-demonstrative, noun-possessive and noun-associative phrases, it may be noted that those modifiers all have consonant-initial agreement prefixes, unlike (most) adjectives and the relative pronouns. Vowel coalescence does not apply to those modifiers, yet the inserted high tones surface one syllable to the right of the final syllable of the noun just as they do in the vowel-initial modifiers. In the next section I will argue that the tone pattern of phrases with consonant-initial modifiers provides strong evidence that the inserted high tone must necessarily be associated with the final syllable of the noun in Jita, and not arbitrarily so, as Massamba (1982) claimed for Ruri.

4. EVIDENCE FOR HIGH ASSOCIATION TO THE FINAL SYLLABLE OF THE NOUN

In Massamba's (1982) discussion of the Ruri noun phrase data, he states that the choice of whether the inserted accent in noun-modifier phrases is associated with the final syllable of the noun or the first syllable of the modifier is a purely arbitrary one, since they collapse into a single syllable after vowel coalescence. However, I will argue in this section that the inserted high tone in Jita must be

associated with the final syllable of the noun: associating it with the first syllable of the modifier would predict incorrect results. In fact, noun-demonstrative phrases in Ruri provide evidence that high tone (or accent) association to the final syllable of the noun is to be preferred in that language also.

In Jita, an analysis associating the inserted high tone with the final syllable of the noun has two main arguments in its favor. Firstly, it directly captures the generalization that the tone patterns of all-low nouns and final-high nouns are neutralized in noun-modifier phrases. If the inserted high is associated with the final syllable of the noun, then the representation of all-low nouns has become identical to that of final-high nouns when RS applies.

Secondly, not all modifiers in Ruri and Jita take an agreement prefix which has a vowel pre-prefix to coalesce with the final vowel of the noun. Such modifiers are consonant-initial, yet the inserted high tone surfaces one syllable rightward of the final syllable of the noun just as it does in the vowel-initial modifiers. Examples of consonant-initial modifiers from Ruri which trigger accent insertion are found in noun-demonstrative phrases (see (29), above). In Jita, not only demonstratives, but also certain adjectives and quantifiers, possessives and the associative particle take consonant-initial noun class agreement prefixes (see (43), (44), (45), above). If the inserted high tone were associated with the first syllable of the modifier in these phrases, the wrong tone patterns would result in every case. This is illustrated by comparing the correct derivation of omukeka gúmutuku 'red mat' in (47), below, with the incorrect derivation in (48) which results when the inserted high tone is associated with the first syllable of the modifier:

(47) High Association with the final syllable of the noun:

omu keka gu mutuku --> omukeka gúmutuku 'red mat'

UR	[omu keka] _N	[gu mutuku] _{modif}
	mat	red

		H	
		⋮	
NPH11	omu keka		gu mutuku

Vowel		
Coal.	N/A	
RS &		
Delink	omu keka	gu mutuku
		H f
		- - - - -
SR	omukeka gúmutuku	

(48) High Association with the initial syllable of the modifier:

omu keka gu mutuku --> omukeka gúmutuku 'red mat'

UR	[omu keka] _N	[gu mutuku] _{modif}
	mat	red

		H f
NPH11	omu keka	gu mutuku
		- - - - -

Vowel	
Coal.	N/A

RS &		
Delink	omu keka	gu mutuku
		H f
		- - - - -
SR	*omukeka gumútu <u>ku</u>	

It can be seen in (48) that when the inserted high tone is linked with the initial syllable of the modifier, it surfaces one syllable too far to the right.

Phrases of penult-high or final-high nouns with consonant-initial modifiers do not have an inserted high tone on the surface, just like those with vowel-initial modifiers (compare (43), (44), (45) with (46)). Thus, Meeussen's Rule (MR) and the Twin Sister Principle, respectively, must apply in these phrases to delete the inserted high tone. However, if the inserted high tone were associated with the first syllable of the modifier, neither of these rules could apply in phrases with consonant-initial modifiers, and incorrect derivations would result as illustrated in (49) and (50), below:

(49) Final-High Noun Phrase, High Association with the initial syllable of the modifier:

ji n swí ji mutuku --> jinswi jímutuku 'red fish (pl)'

UR	$\begin{array}{c} \text{H} \\ \\ [\text{ji n swi}]_N \\ \text{fish (pl)} \end{array}$	$\begin{array}{c} [\text{ji mutuku}]_{\text{modif}} \\ \text{red} \end{array}$
----	---	--

NPH11	$\begin{array}{c} \text{H} \\ \\ \text{ji n swi} \end{array}$	$\begin{array}{c} \text{H} \\ \vdots \\ \text{ji mutuku} \end{array}$
-------	---	---

Twin Sister N/A

MR N/A

Vowel Coal. N/A

RS & Delink	$\begin{array}{c} \text{H} \\ \vdots \\ \text{ji n swi} \end{array}$	$\begin{array}{c} \text{H} \\ \vdots \\ \text{ji mutuku} \end{array}$
-------------	--	---

SR *jinswi jímutuku

(50) Penult-High Noun Phrase, High Association with the initial syllable of the modifier:

li kamba li mutuku --> likambá limutuku 'red feather'

UR	$\begin{array}{c} \text{H} \\ \\ [\text{li kamba}]_N \\ \text{feather} \end{array}$	$\begin{array}{c} [\text{li mutuku}]_{\text{modif}} \\ \text{red} \end{array}$
----	---	--

NPH11	$\begin{array}{c} \text{H} \\ \\ \text{li kamba} \end{array}$	$\begin{array}{c} \text{H} \\ \vdots \\ \text{li mutuku} \end{array}$
-------	---	---

Twin Sister N/A

MR N/A

Vowel Coal. N/A

RS & Delink	$\begin{array}{c} \text{H} \\ \vdots \\ \text{li kamba} \end{array}$	$\begin{array}{c} \text{H} \\ \vdots \\ \text{li mutuku} \end{array}$
-------------	--	---

SR *likambá limutuku

It can be seen in both (49) and (50) that linking the inserted high tone with the initial syllable of the modifier derives one more high tone than actually surfaces.

A High Insertion rule in Jita associating the inserted high tone with the first syllable of the modifier would thus have to apply only on the condition that the modifier is vowel-initial, otherwise association is with the final syllable of the noun. The same holds true for Ruri. Demonstratives are consonant-initial in that language, yet Massamba analyzed noun-demonstrative phrases as triggering insertion of an accent on the final vowel of the noun. If the accent were associated with the first vowel of the demonstrative instead, the same sort of incorrect tone patterns would be derived as for Jita. Since a rule linking the inserted high tone or accent with the final syllable of the noun makes correct predictions in all cases, it is clearly to be preferred.

5. PROBLEMS IN DEFINING THE DOMAIN OF NOUN PHRASE HIGH INSERTION

In this section I will discuss the proper formulation of the rule of Noun Phrase High Insertion (NPHI1), and especially problems encountered in specifying its domain. First, I will justify limiting the rule to within the noun phrase, by showing that no high tone is inserted in other phrasal contexts. Second, I will show that "modifier" must be defined in such a way as to distinguish locative-NP modifiers, which do not trigger NPHI1, from the modifiers which do. Third, I will show that while a high tone is always inserted between a noun and its adjacent (non-locative) modifier, it may also occur between modifiers following the noun. To account for this, two possible revised versions of NPHI1 are proposed: one which inserts a high tone before a modifier phrase in N'', and another which inserts a high tone between any two daughters of N''. However, since only the first of these revisions of NPHI1 makes correct predictions in the case of coordinate NP's, I conclude that it is necessary to refer to the constituent, "N'' modifier phrase," in order to formulate the rule of NPHI properly. The fact that noun class agreement occurs in the same domain as NPHI supports the claim that N'' modifier phrases are a constituent in Jita.

5.1. THE NOUN PHRASE AS THE DOMAIN FOR HIGH INSERTION

The rule of NPH11 (32), cited again below for convenience:

(32) Noun Phrase High Insertion, version 1 (NPH11)

$$6 \rightarrow 6 / \begin{array}{c} \text{H} \\ \vdots \\ \text{[...]} \end{array} \text{N [6...]}_{\text{modif}} \text{N}'$$

applies in a very restricted domain, namely, when a noun is followed by a modifier within a noun phrase (N'). In section 3, above, I showed that NPH11 does indeed apply between a noun and any modifier. In this section I will justify limiting NPH11 to the noun phrase by showing that it does not occur after nouns which are not followed by a modifier but by some other constituent, nor does it occur in verb phrases between verbs and their arguments or modifiers.

In order to test the validity of limiting NPH11 to the noun phrase, one could remove that condition on the rule and see if additional high tones occur in other possible domains. I tested three possibilities, namely, whether:

(51a) a high tone is inserted after every noun, not just one followed by a modifier: $\emptyset \rightarrow \text{H} / \text{]N } \underline{\quad}$

(51b) a high tone is inserted after every phrasal head, not just nouns (for example, after verbs): $\emptyset \rightarrow \text{H} / \text{]X } \underline{\quad}$

(51c) a high tone is inserted before every modifier (for example, before adverbial or prepositional modifiers of V): $\emptyset \rightarrow \text{H} / \underline{\quad} [\text{]modif}$.

Additional high tones are not found in any of these contexts, however. There is no high tone after a nominal subject or between the indirect object and direct object of a verb, as (51a) would predict:

(52a) Subject]N Verb
aBa nu]N Baañwā ---> aBanu Baañwā 'people drank'
people drank

(52b) Indirect Object]N Direct Object
caguisya omu limi]N omu keka --->
we sold farmer mat
caguisya omulimi omukeka 'we sold a farmer a mat'

No additional high tone appears, either, after a verb followed by an object, as (51b) predicts (but (51c) does not), or after a verb followed by a modifier (as both (51b) and (51c) predict):

(53) Verb]x Object

a lu:Bire]y omu sa:ni waê --> alu:bire omusa:ni wáê
 he followed friend his 'he followed his friend'

(Note that NPH11 does apply between omusa:ni 'friend' and its modifier, waê 'his'.)

(54) Verb [Modifier

(a) agenda [Bwangu]modif
 he ran quickly

--> agenda Bwangu 'he ran quickly'

(b) Bafula [kisi]modif --> Bafula kisi

they washed well 'they washed well'

(c) afula [kumugera]modif --> afula kumugera

he washed at river 'he washed at the river'

(d) caBásakila [muluto:ke]modif

we-them helped in banana field

--> caBasákila muluto:ke 'we helped them in the
 banana field'

Thus, limiting high insertion to within the noun phrase is necessary to predict its occurrence correctly. No high tone is inserted following nouns or phrasal heads, or before modifiers in other phrasal contexts.

5.2. THE PROBLEM OF LOCATIVE-NP MODIFIERS

Although I have claimed until now that NPH11 applies between a noun and any following modifier, there is actually one exception: locative noun phrases which functionally are nominal modifiers do not trigger NPH11 as shown in the examples below:

(55a) [aBa kokolo]N [kumuliro]loc NP

old people by fire

--> aBakokolo kumuliro 'old people by the fire'

(55b) [ec e:yo]N [[i:ñuma]N [yá omulyango]modif]loc NP

broom behind of door

--> ece:yo i:ñuma y ómúlyango 'broom behind door'

(Note that NPH11 applies within the locative noun phrase, just as it does in other noun phrases, accounting for the additional high tone in (55b) on the modifier phrase modifying i:ñuma 'behind'.)

In this section I will argue that the locative noun phrases are not only distinguished from the other modifiers by the fact that they do not trigger NPH11. They are also morphologically, functionally, syntactically and

semantically distinct from the modifiers which trigger NPH11, justifying that they should be structurally distinct.

The first difference to be noted between locative modifiers and the other nominal modifiers is that locative modifiers do not show noun class agreement with the nouns they modify. To illustrate, in all the noun-modifier phrases below - and all the noun-modifier phrases cited to now - which do trigger NPH11, the modifiers have class prefixes showing agreement with the nouns they modify (the agreement prefixes are underlined):

(56) Noun + non-locative modifiers, showing agreement

- (a.1) [aBa kokolo]_N [aBa jimâ]_{modif}
 old people good
 --> aBakokolo Bájimâ 'good old people'
- (a.2) [aBa kokolo]_N [Ba lí:ya]_{modif}
 old people those
 --> aBakokolo Bálí:ya 'those old people'
- (a.3) [aBa kokolo]_N [Bá ama guru ama lé:la]_{modif}
 old people of legs long
 --> aBakokolo Bá máguru málé:la
 'old people with long legs'
- (b.1) [ec eeyo]_N [eci yáya]_{modif}
 broom new
 --> eceeyo cíyáya 'new broom'
- (b.2) [ec eeyo]_N [c aô]_{modif} --> eceeyo cáô
 broom your 'your broom'
- (b.3) [ec eeyo]_N [c á omugási]_{modif}
 broom of woman
 --> eceeyo c ómugási 'the broom of the woman'

If these phrases are compared with those in (55), above, containing the same nouns, it can be seen that the locative modifiers do not agree with the nouns. Instead, locative modifiers are invariable, as shown below:

- (57) Noun + Locative NP
- (a) 'the cloth on the bed' [inguBo]_N [kucitaBo]_{loc NP}
- (b) 'the book on the bed' [ecitaBo]_N [kucitaBo]_{loc NP}
- (c) 'the bag on the bed' [omufuko]_N [kucitaBo]_{loc NP}

Also unlike the modifiers which do agree with nouns, locative noun phrases may modify verbs as well as nouns, with no change in form. Only the position of the locative will generally determine which element it modifies. For example, in the phrase below, the locative follows and is understood to modify the noun, so that the interpretation of the phrase is, roughly, "The friends by the door (now are

the ones) whom we talked to":

- (58) aBasa:ni kumulyango aBo caalómá náBô
 friends by the door REL we talked to them
 The friends by the door whom we talked to.

By contrast, in the following phrase, the locative follows and is understood to modify the verb, so that the interpretation is, "The friends whom we talked to (when we were all) by the door":

- (59) aBasa:ny aBó caalómá náBô kúmulyango
 friends REL we talked to them by the door
 Friends whom we talked to by the door.

In sum, locative modifiers do not show agreement with the nouns they modify, and - probably because they do not - they may modify both nouns and verbs. These qualities distinguish them morphologically and functionally from the nominal modifiers which trigger NPH11.

Syntactically, too, locative phrases may be distinguished from the other nominal modifiers. While order among the other modifiers is relatively free (except that relative clauses always follow the others), locative noun phrases may not be freely ordered. Instead, they must follow all other modifiers except relative clauses (as in (58), above). The examples below show that an adjective, for example, may precede or follow possessives, demonstratives and associative phrases - either order is acceptable. (Note that NPH11 has applied in some cases not only between the noun and its adjacent modifier, but also between the two modifiers. This problem will be discussed in the next section.):

- (60) Noun-Adjective-Possessive (adjective underlined)
 'your heavy frying pan'
 (a) eci kára:ngiro eci sito c aô --->
 frying pan heavy your
 ecikarángirw ecísito cáô

OR

- (b) eci kára:ngiro c aô eci sito --->
 frying pan your heavy
 ecikarángiro cáw ecísito

- (61) Noun-Adjective-Demonstrative (adj. underlined)
 'those fierce leopards'
 (a) ji n dará ji n duru ji lí:ya --->
 leopards fierce those
 jindara jínduru jílí:ya
- OR
- (b) ji n dará ji lí:ya ji n duru --->
 leopards those fierce
 jindara jíli:yá jinduru
- (62) Noun-Adjective-Associative Phr. (adj. underlined)
 'the old suitcase of the teacher'
 (a) li sandikwá li kokolo ly á omw alimú --->
 suitcase old of teacher
 lisandikwa líkokolo ly ómwálimú
- OR
- (b) li sandikwá ly á omw alimú li kokolo --->
 suitcase of teacher old
 lisandikwa ly ómwálimu líkokolo

However, it is not possible to freely order an adjective with respect to a locative noun phrase. The adjective must precede the locative or the phrase is unacceptable, as shown below (adjective underlined):

- (63) 'the young people by the door'
 (a) aBa nu aBa lela ku mu lyango --->
 people young by door
 aBanw aBálela kumulyango
- BUT
- (b) * aBa nu ku mu lyango aBa lela
- (64) 'the heavy stones by the river'
 (a) ama Bui ama sito ku mu gera --->
 stones heavy by river
 amaBuy amásito kumugera
- BUT
- (b) * ama Bui ku mu gera ama sito

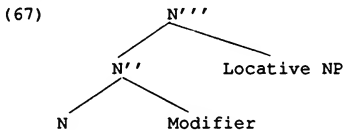
Finally, locative modifiers do not have the same specific, contrastive meaning as the other modifiers. This can be shown by comparing the interpretation of a noun phrase containing a locative modifier with that of a near-identical phrase in which the locative is contained within an associative modifier phrase:

- (65) Noun + Locative NP Modifier
 'old people by the fire'
 [aBa kokolo]_N [ku mu liro]_{loc} NP
 --> aBakokolo kumuliro

- (66) Noun + Associative Modifier Phrase
 'old people by the fire'
 [aBa kokolo]_N [B á ku mu liro]_{modif} -->
 aBakokolo Bákumúliro

Both phrases may be translated as 'old people by the fire,' but the phrase with the locative modifier (65) has the non-restrictive interpretation, "Old people who happen to be by the fire" (these interpretations are in no way to be taken as postulated deep structures), while the phrase with the associative modifier (66) has the restrictive interpretation, "Among the old people here and there, the ones specifically by the fire as opposed to somewhere else."

Thus, the fact that the locative modifier does not trigger NPH11 is not exceptional, since the locative modifier is also clearly distinguishable morphologically, functionally, syntactically and semantically from the nominal modifiers which do trigger NPH11. I suggest, then, that NPH11 is still correctly characterized as applying within NP (or N''), and that locative modifiers are outside that domain - for example, daughters of a higher structure such as N''':



5.3. THE PROBLEM OF HIGH INSERTION BETWEEN MODIFIERS

The rule of NPH11 is formulated so as to insert a high tone only on the final syllable of a noun when it is followed by a modifier within N''. As has already been noted (see (60a), (61a) and (62a), above), however, in a noun phrase containing more than one modifier, a high tone may be inserted not only between the noun and adjacent modifier, but also between the modifiers. Additional examples of this are given below:

- (68) Noun Phrases with more than one modifier:
 (a) [eBi taBo]_N [eBi sito]_{modif} [eBi kokolo]_{modif} -->
 books heavy old
 eBitaBw eBísito Bíkokolo 'old heavy books'
 (b) [oBu ji]_N [Bu mutuku]_{modif} [Bw aó]_{modif} -->
 thread red your
 oBuji Búmutuku Bwáó 'your red thread'

- (c) [li twangirol]_N [li sito]_{modif} [li lí:ya]_{modif} -->
 mortar heavy that
 litwangiro lísito lílí:ya 'that heavy mortar'
- (d) [i n sikiril]_N [i ng kokolo]_{modif} [yá omu limil]_{modif}
 donkey old of farmer
 --> insikiri íngkokolo y ómúlimi
 'old donkey of the farmer'
- (e) [eBi taBo]_N [eBi sito]_{modif} [eBy o Byá:gwá]_{modif}
 books heavy REL Cl 8-fell
 --> eBitaBw eBísitw eByó Byá:gwá
 'heavy books which fell'

It should be mentioned that, while a high tone is always inserted between the noun and first modifier, it is not consistently inserted between modifiers. For example, it seems to be more likely to occur in questions or when the second modifier is emphasized or considered more contrastive. Also, it is more likely to be inserted between an adjective and another modifier (possessive, demonstrative or associative) when the adjective precedes the other modifier. When the adjective follows, a high tone is rarely inserted (except in questions or for emphasis, as already mentioned).

These problems aside, it is clear that the rule of NPH11, which only inserts a high tone between a noun and a modifier, does not account for those cases when high tones are also inserted between modifiers. One possible revision of NPH11 would be to delete reference to the noun but retain reference to a modifier phrase in the structural description of the rule. This version of NPHI could be stated as follows:

(69) Noun Phrase High Insertion (Pre-Modifier)

Within N'', associate a high tone with the last syllable of any word which immediately precedes a N'' modifier phrase (MP). (Obligatory if the word preceding MP is a noun; optional if the word is a member of another MP.)

Alternatively, since both head nouns and all the modifiers which trigger NPH11 are daughters of N'' (locative-noun phrase modifiers are daughters of N'''), another version of the rule which would account for high insertion in all the cases discussed so far could be formulated as follows:

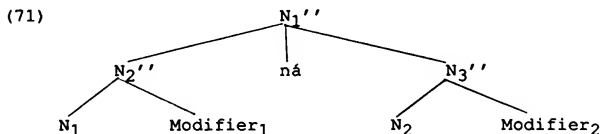
(70) Noun Phrase High Insertion (Inter-Daughter)

Associate a high tone with the final syllable of a constituent X when it is followed by another (non-null) constituent Y, if both X and Y are daughters of N''. (Obligatory if X is a noun; optional if X is a modifier phrase.)

These two rules do not make the same predictions, however. The rule of Pre-Modifier (69) predicts that a high tone is inserted only before a modifier phrase in N''. By contrast, the rule of Inter-Daughter (70) predicts that a high tone will be inserted between any two daughters of N'', whether or not either is a modifier phrase. In the next section I will argue that high tone insertion in coordinate noun phrases provides evidence that NPFI must be limited to applying before a modifier phrase, as in (69). Inserting a high tone between all daughters of N'', as in (70), gives incorrect results.

5.4. THE PROBLEM OF HIGH INSERTION IN COORDINATE NOUN PHRASES

Since coordinate N'' phrases and the conjunction which links them are daughters of N'' but not modifier phrases, this type of construction will allow us to test which version of the rule of NPFI, Pre-Modifier (69) or Inter-Daughter (70), best accounts for the Jita data. Given the coordinate noun phrase structure below (ná is the conjunction, 'and'):



Pre-Modifier (69) predicts that only two high tones will be inserted: one before Modifier₁ and the other before Modifier₂. Inter-Daughter (70), on the other hand, predicts that four high tones will be inserted: one between each of the terminal elements in the above structure, since they are all daughters of N''.

The phrases below show that only two high tones are, in fact, inserted - one before each modifier phrase (MP):

(72) Coordinate N' Phrases

(a)

[[omukeka [gumutuku]_{MP}]_{N'}, ná [eBitaBo [eBisito]_{MP}]_{N'}]_{N'},
 mat red and books heavy
 ---> omukeka gúmutuku n eBítaBw eBísito
 'red mats and heavy books'

(b)

[[jinjofu [jilela]_{MP}]_{N'}, ná [jintwiga [jilé:la]_{MP}]_{N'}]_{N'},
 elephants young and giraffes tall
 ---> jinjofu jílela na jintwíga jílé:la
 'young elephants and tall giraffes'

(c)

[[amadarisyá [mwenda]_{MP}]_{N'}, ná [emilyango [ená]_{MP}]_{N'}]_{N'},
 windows nine and doors four
 ---> amadarisyá mwénda n emílyangw éná
 'nine windows and four doors'

(d)

[[amayarage [gékisi]_{MP}]_{N'}, ná [jinumbu [jékisi]_{MP}]_{N'}]_{N'},
 beans tasty and sw. potatoes tasty
 ---> amayarage gékísi na jinúmbu jékísi
 'tasty beans and tasty sweet potatoes'

Thus, the prediction made by rule (69) that high tones are inserted only before the modifier phrases in coordinate N' phrases is correct. This is illustrated in the derivation of (72a), below:

(73) Derivation of (72a) with Rule (69), Pre-Modifier

H

UR [omukeka [gumutuku]_{MP}]_{N'}, na [eBitaBo [eBisito]_{MP}]_{N'}]_{N'},
 mats red and books heavy

Rule (69) H H H
 | | |
 omukeka gumutuku na eBitaBó eBisito

na-HA H H H
 | | |
 omukeka gumutuku na eBitaBo eBisito

Vowel Coal. H H H
 | | |
 omukeka gumutuku n eBitaBw eBisito

		H		H		H
RS &		↑		↑		↑
Delink	omu	keka	gumu	tuku	n	eBítaBw eBísito
SR	omu	keka	gúmu	tuku	n	eBítaBw eBísito
	'red mats and heavy books'					

(Note that the conjunction, na, contributes a high tone, but this high tone surfaces two syllables rightward of the conjunction if the following word is consonant-initial. This is because the high tone is not linked to the conjunction underlyingly. Rather, it links to the next syllable rightward, before vowel coalescence, by a special association rule "na-HA" then undergoes RS and Delink, as illustrated in derivation (73).)

The rule of NPFI is therefore best formulated as in (69), specifying that a high tone is only inserted before a N'' modifier phrase rather than between any two daughters of N''. It should also be noted that the coordinate N'' phrases do not show noun class agreement with each other nor does the conjunction na agree with either noun. This confirms the observation made in the discussion of locative-noun phrase modifiers, that where NPFI does not occur, agreement does not occur, either.

6. CONCLUSION

In this paper I have argued that the additional high tones found in Jita noun-modifier phrases may be best accounted for by a rule (NPFI) which inserts a high tone on the final syllable of any word preceding a modifier phrase within N''. Alternative formulations of the rule which expand its domain outside of N'' or which do not distinguish modifier phrases from other daughters of N'' were considered and shown to predict high tones would be inserted in contexts where they do not, in fact, occur.

Independent motivation for "N'' modifier phrase" as a constituent in Jita comes from the fact that N'' modifier phrases are also the domain for noun class agreement. Nominal modifiers outside of N'', such as locative-noun phrases, neither show agreement nor trigger NPFI. Daughters of N'' which are not modifier phrases, like coordinate N'' phrases and the conjunction which links them, likewise neither show agreement (i.e., the N'' phrases do not agree with each other and the conjunction does not agree with either N'' phrase, though there is agreement within each conjoined N'' phrase), nor do they trigger NPFI. I suggest, then, that the constituent "N'' modifier phrase" should be included among the constituents to which phrasal rules may be sensitive, since only a rule of NPFI which may refer to

"N' modifier phrase" as the trigger for high tone insertion correctly accounts for all the Jita data.

NOTES

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EXPLORING THE DICTIONARY: ON TEACHING FOREIGN LEARNERS
OF ARABIC TO USE THE ARABIC-ENGLISH DICTIONARY

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This paper explores some of the special problems students of the Arabic language face in learning to use the Arabic-English dictionary efficiently.

Reading is an activity of great complexity, and never more so than for the adult learner of a foreign language who wishes to cope with texts at, or even somewhat beyond, his or her ability to understand the language. In the case of Arabic, such learners might be undergraduates following a university course in Arabic, businessmen concerned with commerce with the Arab world, scholars interested in non-linguistic aspects of the Middle East, linguists attracted by the complexities of Arabic morphology, or non-Arab Muslims concerned to deepen their knowledge of the Koran.

The primary aid for this diverse group of learners is the bilingual dictionary, which enables the learner to grasp, more or less approximately, the meanings of those words not yet part of the passive vocabulary. In dealing with a difficult text the learner will often find himself juggling with several unknown words in the same sentence or even the same clause, searching for the most appropriate combination of the several meanings of each one. Dictionary skills are therefore at a premium in this activity.

Arabic has an immensely rich vocabulary, and for the foreign learner of Arabic the task is further complicated by the fact that the graphological representation of the language in a normal text contains no indication of the vowels, but only of the consonants. Thus using a dictionary in Arabic is a more demanding activity than in, say, English, where all that is required to find any word is a knowledge of the alphabet.¹ In this paper we intend to examine briefly the graphological representation of unvowelled Arabic, and suggest a method by which students can be prepared most efficiently to read it. In particular, we shall concentrate on the use of the Arabic-English dictionary and offer some exercises to practise the students in the skills required to use it effectively.

We have not been able to discover much in the way of previous writing on the subject of teaching the use of the Arabic dictionary. In Arabic, Muhammad Muhiy al-Din Abd al-Hamid's Al-Masaalik al-Qarabliyyah (5th ed. 1966) mentions, in its first volume, the teaching of the alphabet in its isolated and combining forms, and the necessity of finding words according to their roots. It also deals briefly with the extra problems posed by weak radicals, but his book is written mainly with native speakers of Arabic in mind. His lack of diagrammatic systematization and the fact that non-native speakers are given only a brief mention detracts from the usefulness of his work for our practical purpose. Ahmad Abd al Ghafur Attar's Muqaddimat al-sahhah (3rd ed. 1984), is chiefly a history of lexicography, and again, the problems of teaching the use of Arabic dictionaries to foreign learners of Arabic is merely glanced at.

The text currently most widely used for teaching Arabic to foreigners is the two-volume Elementary Modern Standard Arabic (rev. ed. 1983), by Abboud and McCarus. This devotes a few pages to the use of the dictionary, but though it offers a very brief explanation of the system of listing words according to the roots and a small amount of dictionary practice, the student is left very much to his or her own devices in getting to grips with the complexities.²

Rather more work has been done on the teaching of dictionary skills to foreign and native learners of other languages than Arabic. Richard C. Yorkey's Study Skills for Students of English (1982), for example, has a useful chapter (Chap. 2) on "Using an English Dictionary," but the particular combination of Arabic morphology and graphology renders the acquisition of dictionary skills in Arabic a unique task, and one which deserves separate consideration. In this paper we shall not be attempting to give comprehensive answers to the problems involved, but to try to define what these problems are and to suggest some kinds of exercise which will help the student.

A complete account of Arabic morphology is clearly beyond our scope here, but a brief introduction will be useful for readers who are not specialists in Arabic. Arabic grammarians have traditionally analyzed the verbal morphology of Arabic in terms of a trilateral or, more rarely, quadrilateral root and its "derived forms," which number, for modern practical purposes, twelve. Each derived form is itself the source of a number of other nominal and adjectival forms. Thus, the root k-t-b is, in its simplest lexical form,

kataba -- he wrote.

From this are derived the following words, among many others:

active participle: kaatib --- a writer, writing,
passive participle: maktuub -- written, a letter.

Note that according to context these may have a verbal or nominal meaning. These three words derive directly from the root in its first form, kataba, but a modern standard Arabic trilateral verb root may have up to ten derived forms. Not all of these exist for the verb kataba, but theoretically they could. The following is a list of the ten forms; those forms which are not in fact used are marked with an asterisk.

- I kataba
- II kattaba
- III kaataba
- IV aktaba
- *V takattaba
- VI takaataba
- VII inkataba
- VIII iktataba
- *IX iktabba
- X istaktaba

Each of these forms has a meaning related with a degree of predictability to the meaning of the root. For example, the second form generally has a causative meaning; thus kattaba means "to make someone write something." The third form often contains the notion of sharing; thus kaataba means "to correspond with." The fifth form is takattaba, which has a reflexive meaning closely related to that of the third form -- to correspond (mutually). Each form also has its derivative active and passive participles: for example the active and passive participles of the third form are mukaatib and mukaatab, respectively.

Purely alphabetical dictionaries of Arabic have occasionally been advocated--for example, Muhammad al-Bukhari al-Misri proposed such a recension of Lisaan al 9arab.³ Munir Ba'albaki also mentions these issues in his introduction to Al Mawrid.⁴ Nevertheless, modern lexicographers of Arabic have generally based their dictionaries on the extraordinarily systematic morphological structure. Thus, despite the fact that they begin with different letters of the alphabet, katab, takaatab, and mutakaatib and

so on are all to be found in the same place in the dictionary under the heading of the root, k-t-b. Thus the vital piece of knowledge for the would-be user of an Arabic dictionary is the root of the word he or she wishes to look up.

In actual fact, a dictionary ordered according to root-consonants is not such an unnatural demand on the L2 learner as it is on the native speaker, for, according to the system in most textbooks, the L2 learner learns first the root and then the derived forms, whereas the native speaker has learned the derived forms before becoming conscious of the system, and does not naturally associate them in his or her mind, any more than a native speaker of English is naturally aware of the etymological relationships among the words in daily use. Diane Larsen-Freeman has shown that it is actually easier for the second-language learner to build vocabulary by learning morphemes than by learning discrete lexical items.⁵ Mastering the derived forms remains, however, a difficult but essential step for any learner of Arabic who wishes to use a dictionary; that is, any learner who wishes to go beyond more "kitchen-Arabic."

The system will become clearer if we examine an actual entry (considerably abridged) from the Wehr-Cowan Dictionary of Modern Written Arabic. The root k-t-b will again be convenient. Wehr does not make explicit the relationship between the ten forms and their inflexional derivatives, so this has been added in brackets for forms other than the first.

kataba to write II to make (s.o.) write (s.th.) III to correspond (with s.o.) IV to dictate (to s.o. s.th.), to make (s.o.) write (s.th.) VI to write to each other, keep up a correspondence VII (s.o.) to write (s.th.)

كتاب kitāb pl. كتب kutub piece of writing, letter, note, book

كاتب kutubī pl. -ya bookseller

كتاب kuttāb pl. كتائب katātīb Koran school (lowest elementary school)

كتيب kutayyib booklet

كتابة kitāba (act or practice of) writing, script, poster

كاتب kitābī written, literary, scriptural

كتيبة	<u>katība</u> pl.	كاتب	<u>katāib</u> document
مكتب	<u>maktab</u> pl.	مكاتب	<u>makātib</u> office, desk
مكتبة	<u>maktaba</u> pl. -at	مكاتب	<u>makātib</u> library, bookstore, desk
مكشاة	<u>miktāb</u>		typewriter
مكاتبة	<u>mukātaba</u> (III)		correspondence
اكتتاب	<u>iktitāb</u> (VIII)		registration
استكتاب	<u>istiktab</u> (X)		dictation
كاتب	<u>kātib</u> pl. -ūn,	كاتب	<u>kuttāb</u> secretary, typist, author
مكتوب	<u>maktūb</u>		written, recorded, fated; message, letter
مكاتب	<u>mukātib</u> (III)		correspondent, reporter
مكتتب	<u>muktatib</u> (VIII)		subscriber

We see here that, though k-t-b has a majority of the derived verb forms as active members of the Arabic lexicon, not all possible forms are represented. Other verbs exist in only a single form. (For example, the root s-k-9 exists lexically only in the fifth derived form, tasakka9a--to grope about.) Similarly, the nominal and adjectival measures deriving from the verbal forms by no means exhaust the theoretically possible words. But we note also that the dictionary presumes a knowledge of all available measures, as the forms of the Arabic verb are indicated only by a number--III, VI, etc.--followed by English equivalents, and the nominal or adjectival inflexional measures are only given separate entries in the dictionary when they have some specialized meaning other than that implied by its morphological relationship with the verbal form. Istiktab, for example, the verbal noun (masdar) of the tenth form, is the normal term for "dictation", and thus merits an entry of its own, without, however, any explicit indication that it related to the then derived form. Mukattib, however, exists only as a derivative of the second form, kattaba--to make someone write something--and thus is not represented separately in the dictionary.

If this were not sufficiently complex, we have now to consider those varieties of roots which differ from the standard trilateral root described

above. When one or more of the root letters is w, y, or ? (so-called weak, hollow, and hamzated verbs), or when the second and third letters are the same, further complications, morphological and orthographical, ensue.⁶ For example, the imperative (masculine singular) of kataba is uktub, but the imperative of waqafa -- to stop -- is qif, as the weak first radical is dropped in this form. The first verbal form of the root k-w-n is kaana, and the imperative is kun; in the perfect tense the weak radical causes the lengthening of the first vowel, and in the imperative the weak radical is again dropped. In order to be able to look the word up in a dictionary, therefore, the learner must already be familiar with the morphology of that kind of verb. Even then, a form like istifaadah, while obviously a verbal noun of the tenth form with a weak middle radical, provides no clue as to whether the middle radical is w or y (f-w-d or f-y-d), so the student may have to look the word up twice. An imperative with only two letters, say, z-r, might theoretically derive from the roots ?-z-r, w-z-r, y-z-r, z-w-r, z-y-r, z-r-w, or z-r-y, so a good deal of patience might be necessary to track it down.

How, then, do we teach the beginner, or pre-Intermediate learner of Arabic to use the dictionary? Assuming, in the first place, that such a learner knows the alphabet by heart, he or she should perhaps begin in the rather ad hoc fashion adopted by most textbooks. But as the vocabulary is introduced it should be given in lists ordered according to the principles of Arabic lexicography, rather than simply alphabetically. Thus mudarris (teacher) should be placed immediately after darasa (to study, learn), and before lawh (blackboard), even though, as in the Roman alphabet, Arabic l comes before m. As weak and other difficult radicals are encountered the student should be taught the principles of looking them up in a dictionary, and frequent exercises given in sorting a jumbled list of words into order according to the roots. Any ambiguities (see z-r above) should be pointed out at this stage, so that the student is not confused either as to the morphology of the words involved or as to his or her own competence at using a dictionary.

II

In the second section of our paper we shall suggest a number of exercises in dictionary skills for beginning and intermediate students. But before doing so we must deal with the question, why teach beginners to use the dictionary at all? Why not wait until the student has a grasp of the whole of the morphology before requiring him or her to do more than learn word lists? In fact, we believe in the importance of dictionary skills from the earliest stages of learning Arabic. This must be the case always, we

feel, with adult learners. Children should certainly be taught a language in the communicative context, with the additional incentive of simplified readers, and thus the formalities of grammar and the use of dictionaries may perhaps be put off for two or three years. But adult learners can neither afford nor do they wish to spend so much time before coming to grips with genuine unadulterated language such as is found in literature, newspapers, or in broadcasts. With Arabic, far more than with a European language, this will necessitate a large amount of earnest work with dictionaries even to get the gist of what is written. It is well worth while, therefore, to spend time preparing the student to perform these frequently repeated operations as efficiently as possible.

There is of course, a caveat to be uttered here. It is not desirable that the student be practiced in the use of dictionaries to the detriment of other reading skills. The ability to deduce the meaning of the word from its context is essential if the student is not to become unhealthily dependent on the dictionary, with consequent loss of speed and increase of boredom and frustration when reading. Deduction of meaning from context, speed-reading, and other skills are vital to the serious reading in any language, but are not within the scope of this paper.

For the purposes of the kind of exercise we shall be offering here, however, we shall assume that the learner has had one semester of Arabic. He or she will know the alphabet in its order, and have at least some familiarity with the common prefixes and suffixes of Arabic morphology. The student will therefore have little difficulty looking up easier words, such as qaaḍ wazīr, fārb, and can be expected to know, at least in theory, most of the basic measures of the Arabic verb and its nominal and adjectival derivatives. Thus, for the word yabḥaṭu it will not be necessary to explain that its root is b-h-ṭ and that the y is an inflexion of the imperfect tense. The student will also know, if only by reference to a sort of laboriously memorized chart, that the third form of the verb (according to the system used by Wehr) is baḥaṭ and that the verbal noun (masdar) of this form is mubaḥaṭa.

There are also, of course, phonological variations which produce differences in meaning without any graphological distinction. For example, ktb may be vowelled kataba or kutiba, according to whether the verb is active or passive. The distinction between active and passive might come within the scope of this paper, however, only in the case of verbs with weak middle radicals. The verb lataada (VIII form of qaada) would become uqtīda in the passive, thus complicating the finding of the root. The active and passive participles of such verbs differ similarly: muqtīd and muqtaad. In

order to find the radicals of such forms a weak middle radical is realized as y, even if it is w in the root form. Again, we emphasize that the student is not merely required to be told a rule; as with any skill, practice is required before a rule can be operated.

We are now at the point where the student may be led into the reading of Arabic in its simpler written forms, such as straightforward newspaper reporting, and accordingly, our first exercise consists of a very short newspaper article, simplified only in that guidance is given in finding difficult words in the dictionary.⁷ Potentially confusing foreign words are simply given in their original spellings.

ريمون يبحث مع دي كويار عقد المؤتمر الدولي

الام المتحدة - رويتر - عقد وزير الخارجية الفرنسي جان برنار ريمون والامين العام للام المتحدة خافيير بيريز دي كويار أمس محادثات استمرت ساعة وتركزت على الحرب العراقية - الايرانية ومشكلة الشرق الاوسط.
وقال متحد باسم الامم المتحدة أن المناقشات التي دارت بشأن الشرق الاوسط تركزت على امكانية عقد مؤتمر دولي للسلام والتعليمات التي تقوم بها قوات الطوارئ الدولية التابعة للامم المتحدة في الجنوب اللبناني .

Exercise 1. In the following exercise there is a list of words and four columns to be filled: a. the root letters; b. the number of the verb form and the meaning of the verb; c. the part of speech of the word in question; and d. the English equivalent of the Arabic word in its context in the article. Fill in the blanks opposite each word. (Transliterations would not, of course, be given, and Arabic words in the answers would be written in Arabic script.)

- | | | |
|-------------------|---------------------------|---------------------------|
| a. radicals | b. verb form | normal English equivalent |
| c. part of speech | d. translation equivalent | |

Example: مباحثات mubaahaṭaat

- a. ب ح ث b-h-ṭ
c. verbal noun, pl. d. discussions

1. مؤتمر mu- tamar

- a. b. VIII اتمر (to deliberate)
iṭamara
c. passive participle d.

2. متحدة muttahidah

- a. و ح د w-h-d
c. active participle d.

3. مشكلة muškilah

- a. b. IV اشكل (to be difficult)
aškala
c. d.

4. مناقشة munaagašah

- a. b.
c. verbal noun d.

5. تركزت tarakkazat

- a. b.
c. 3p fem sing of perfect tense d.

6. استمرت istamarrat

- a. م ر ر m-r-r
c. 3p fem sing of perfect tense d.

7. إمكانية imkaanilyyah

- a. م ك ن b.

- m-k-n
c. verbal noun d.
8. تقويم taquum
a. ق و م b.
q-w-m
c. d.

Exercise 2. For this exercise you are given information about these possibly tricky words which will enable you to look up the meaning easily. Give the translation equivalents.

1. quwaat -- قَوَات q-w-y -- noun قُوَّة quwah (force) --
plural has special meaning --
2. lilumam -- لِلَام ?-m-m -- noun أُمَّة ummah -- plural أم
umam + li + definite article --
3. طَوَارِيءٌ tawaari? -- t-r-? -- noun طَوَارِيءٌ taari?a - plural
tawaari? functioning as adjective --

Exercise 3. List the words in exercises 1 and 2 in alphabetical order according to the radicals.

It is worth noting that our hypothetical student would often have been at a complete loss if asked to perform exercise 3 without help. As we have indicated, many educated native Arabic speakers would also find this difficult. Exercises of the above kind will help to confirm the student's grasp of Arabic morphology and at the same time provides practice in the use of the dictionary. But as we have noted, and as is exasperatingly apparent to every lower intermediate learner of Arabic as a foreign language, there are many Arabic words which are either morphologically or graphologically ambiguous. Sufficient examples of this can be found in the passage just examined. For example, استمر istamarra could, from such a learner's point of view, be the VIII form of the root s-m-r -- to spend an evening chatting. This is of course, a graphological ambiguity. An Arabic speaker, reading the word in context, could never make this mistake, but for a foreign learner the mistake is very natural.

Until the learner's vocabulary has expanded there is probably no way in which one can prevent the waste of time involved in such mistaken identification of roots, but it would be helpful for the learner to examine types of ambiguity in order that he will not merely give up when his first or second guess at the word's root proves unprofitable for making sense of the passage. We therefore suggest the following type of exercise to help the learner explore the possibilities thoroughly.

Exercise 4. Note that a word written **متحد** (mtḥd) could theoretically be derived from either of the following roots, either of which might have this graphological exponent of one of their variations in an unvoiced text.⁸

* **م ت ح د** m-t-ḥ-d: XI form (quadriliteral) **متحد** mtaḥḍ -- third person masculine singular

* **و ح د** w-ḥ-d: VIII form **اتحد** ittaḥḍa -- passive or active participle muttaḥid/muttaḥad

In fact, only the first and the last of these is an actual Arabic word, but in some cases of ambiguity there may be several real possibilities. For the following words, write down, in alphabetical order, the possibilities for their derivation in the form given above. Then look in the dictionary and check each form that is a real possibility. (Asterisks to indicate forms that are merely theoretical would not be given to the students.)

a. **استقر**

* **س ت ق ر**: XI form (quadriliteral) third person masculine singular, perfect tense.

* **س ق ر**: VIII form third person masculine singular, perfect tense.

ق ر ر: X form third person masculine singular, perfect tense.

b. **ت ر م**

* **ت ر م**: I form third person masc. sing., perfect tense--tarama

* **ر م م**: V form third person masc. sing., perfect tense--tammama

r-m-y: I form second person sing., masc., jussive--tami

* r-m-w: I form second person sing., masc., jussive--turmu

c.  (Imperative) 

Check the roots which would theoretically yield this form. Note also which of them actually exist.

w-m-r--correct





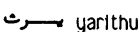
m-w-r--correct--exists

y-m-r--correct

?-m-r--correct--exists

d. Give the possible root or roots of this form. With the aid of the dictionary, check which actually exist.

e. Give the possible roots of the following verbs, using the dictionary to make sure the roots you choose actually exist in the form given below.

 da9aa,  ramaa,  kil,  sal,  yarithu

d-9-w,

r-m-y,

?-k-l/k-y-l,

s-?-l/s-y-l,

w-r-θ

Conclusion

A single brief paper cannot do justice to the complexities of the Arabic dictionary, even in its relatively simple bilingual form. Arabic dictionaries, as we have noted, are structured on morphological as well as alphabetical principles, thus to use them efficiently requires a knowledge of morphology as well as of the alphabet. Naturally, there is no short cut to Arabic morphology, which is such a large part of Arabic grammar as a whole; even a gifted student will take years to be fluent in its use. Nevertheless, it is the experience of generations of learners that the dictionary is a usable and indeed indispensable tool from early on in the process of learning Arabic. Unfortunately, such learners have also experienced the frustration and boredom of groping uncertainly around the dictionary searching for a root they are unsure of. In this paper we have

tried to suggest ways in which their efforts can be minimized, and efficiency maximized at the earliest possible stage.

The principle behind the exercises we have suggested is the following. As in the teaching of any closed system, it is essential for the learner to be aware of the range of possibilities available as the root form of the word with which he is faced. Thus exercises in determining the possible roots of a given graphic form will save the labor of looking up roots which could not give rise to the form in question as well as making it less likely that the student will give up in despair because the correct root has not been considered. As most of the problems are caused by roots that are doubled, weak, hollow, hamzated, etc. the exercises seek to draw the student's attention to the point of difference among them, and to the ambiguities that inevitably occur. Our exercises are only samples, but a small text book or pamphlet which would set out a systematic series to practice the student in every aspect of these complexities would be a most useful addition to the armory of any teacher of Arabic to foreigners. Such a book would not simply practice dictionary skills, but, as we have implied above, it would be a useful aid to memorizing the morphology, one of the hardest tasks confronting any foreign learner of Arabic.

We must finally acknowledge that in the Arab World in general, little has been done in elaborating a methodology of teaching Arabic to non-native speakers. Even the bilingual dictionaries in general use in the Arab world are largely the work of Western Orientalists. Arabic's long-overdue acceptance as one of the official languages of the United Nations makes it more urgent than ever that such a methodology be formulated. Even in America and Britain energetic research in the methodology of teaching English as a foreign language has co-existed for decades with the most traditional grammar-translation methods in teaching Arabic. The two large volumes of McCarus and Abboud's Elementary Modern Arabic only nod in the direction of the communicative approach with rather stilted dialogues for practice. The problems involved in teaching Arabic to foreigners are unique; not only the grammar but the difference between written Arabic and the colloquial dialects presents difficulties not faced by the learner of any European language. But surely, it is not impossible to devise a teaching method which is realistically directed towards the needs of foreign learners to speak, understand, read, and write. We hope that this paper may contribute to the efficiency of teaching the reading of Arabic.

NOTES

¹Even the irregular past tenses such as "went" are generally listed separately. Under this head Webster's has "past of GO."

²In volume 1, explanations are given on pp. 168-229, and 354, and drills on pp. 233, 320, and 354. Volume 2 contains no dictionary work.

³Also worth recording is Al-Khalil Ibn Ahmad's suggestion for a dictionary ordered according to the point of articulation of the sound, beginning with the pharyngeals. Foreign learners may be thankful this notion did not find universal favor.

⁴Al Mawrid, 20th edn. (Beirut: Dar el-Ilm lil Malayen, 1986).

⁵Diane Larsen Freeman, "An Explanation for the Morpheme Acquisition Order of Second Language Learners," Language Learning 26 (1976): 125-134.

⁶A useful concise account of these complexities can be found in David Cowan, An Introduction to Modern Literary Arabic (Cambridge: Cambridge UP, 1978), lessons 15-18.

⁷The article is taken from the Amman newspaper Swat al-ša9b, Tuesday 31 March, 1987, p. 1. We gratefully acknowledge permission to quote.

⁸The term "exponent" is used by J. C. Catford in A Linguistic Theory of Translation (London: Oxford UP, 1965), p. 7 and chap. 9).

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Tonal Polarity in two Gur Languages*

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In this paper we develop an analysis for the tonal polarity found in two Gur languages--Moore and Lama. We claim that tonal polarity is an "epiphenomenon"--the superficial reflex of a rule that dissimilates the high tone of an affix with respect to the high tone of a root. Crucial to our analysis is the postulation of an underlying three-way tonal contrast of high, low, and toneless stems. Our paper is organized as follows. In the first section the polar tones of Moore are introduced. We then encounter a problem in accounting for the tonal patterns found in the associative construction. We postulate an abstract low tone affix for this construction. We then turn to Lama. After the effect of two superficially obscuring tonal rules are removed, we see that Lama also has reflexes of tonal polarity in several categories. We then show that the Lama complexities can be turned to advantage in corroborating the postulation of the low-tone affix for the associative construction in Moore.

1. Some tonal rules of Moore

Moore is a two-tone language of Burkina Faso. In this paper we build on some of the results in the excellent earlier tonal descriptions of Peterson (1971) and Kinda (1983). In our transcriptions acute accent marks a high-toned syllable; low-toned syllables are unmarked. When a syllable has a long vowel, the tone is transcribed on the first half of the geminate. The underdot denotes [-ATR] vowels and the undertilde marks nasalization.

Moore has an extensive system of nominal class suffixes marking singular and plural. In (1) we cite examples from six of the most productive classes.

(1)	sg.	pl.	
	kor-gó	kor-dó	'sack'
	roo-gó	ro-tó	'house'
	wób-go	wób-do	'elephant'
	lán-go	lán-do	'hole'
	bí-d-gó	bí-tó	'sorrel'
	míu-gú	míi-dú	'red'
	tíi-gá	tíi-sé	'tree'
	kǽǽ-gá	kǽǽ-sé	'green'
	sáa-ga	sáa-se	'broom'
	wám-ga	wám-se	'hollow'
	báa-gá	báa-sé	'dog'
	nwáb-gó	nób-sé	'tree sp.'
	gob-ré	gwab-á	'left hand'
	túb-ré	túb-á	'ear'
	kúg-ri	kúg-a	'stone'
	sám-de	sám-a	'debt'
	wám-dé	wám-á	'calabash'
	nób-ré	nwáb-á	'fruit sp.'

Three tonal patterns are to be observed in the data of (1): low tone on the root and high tone on the suffix; high on the root and low on the suffix; and high tone on both the root and the suffix. There are no cases of low tone on both the root and the suffix. This is a glaring gap that any analysis should explain. Since the description of the high-high class is more complex, we shall set these nominals aside until section 2. Given the exclusion of the high-high class, two possible analyses suggest themselves for the remaining low-high and high-low patterns. First, we might propose that stems such as [kor] 'sack' and [sáa] 'broom' have the underlying representations of (2a) with two tones.

(2)	a.	kor	saa
		L H	H L
	b.	kor-go	saa-ga
		/	/
		L H	H L

Since Moore has the limitation of one tone per syllable, the second of the two tones will always be realized on the number suffix (2b). In this way we account for the striking fact that a given root is always associated with the same tonal pattern (low-high or high-low) regardless of the particular number suffixes it selects. This analysis claims that the suffixes lack an inherent tonal specification. They acquire one from the second tone of the root. Moreover, we could account for the high-high pattern by saying that the root contains a single high tone; the underlyingly toneless suffix would then seek out the tone of the root via autosegmental spreading, as in (3).

- (3) baa baa-gə
 | |
 H H

Toneless affixes are quite prevalent and so this analysis is rather natural. There is, however, one worrisome aspect. It fails to explain the systematic absence of the low-low tonal pattern. Phonological inventories are typically hierarchical in nature. The presence of more complex members generally presupposes the existence of simpler elements. For example, CVCC syllables presuppose CVC syllables; mid vowels typically emerge only in the presence of high and low vowels. The analysis proposed above violates this basic thesis of phonological organization. It posits the complex [LH] and [HL] tonal melodies in the absence of a basic [L]. A phonological theory that permits complex units such as [LH] and [HL] only in the presence of the more elementary [L] and [H] would preclude such an interpretation of the Moore tonal patterns.

An alternative analysis explains the low-low gap. It claims that the nominal roots are associated with a single tone (low or high) in the underlying representation (4a).

- (4) a. kor see b. $V \rightarrow [\ominus hi] / \quad V \quad \text{---}$
 | | |
 L H [-\ominus hi]

It also claims that Moore is subject to a rule requiring the suffixal tone to be the opposite of the root tone (4b). Any given root will always induce the same suffixal tone since the suffixal tone is entirely predictable from the root tone by this tonal rule. We thus account for the fact that each root has the same tonal pattern (low-high or high-low) regardless of the number suffix it selects. Furthermore, if we assume that every root has a tone then by the polarity principle there is no way in which the low-low pattern can

be derived since the suffixal tone is always the opposite of the root. (We show how to derive the high-high pattern under this analysis in section 2).

This alternative analysis thus not only accounts for the low-low gap but also posits an underlying inventory of melodies that does not violate the hierarchy thesis. An additional argument in its favor will be presented shortly. But first we must briefly mention a few additional features of the language that play a role in our analysis. First, like many other African tonal languages, Moore has downdrift (Kinda 1983). In the phrase zá léngré of (5) the first two syllables are realized on the same high pitch while a high following a low is phonetically realized on a perceptibly lower pitch.

- (5) zá léngré 'bring a bowl' [- - -]
 H H L H

Second, Moore has the ubiquitous rightward extension of high tones. In Moore this is a sandhi rule operating between words. Since Moore is subject to the limitation of one tone per syllable, a spreading high dislodges a low tone to yield a downstep (6d). We illustrate by placing sáa-ga 'broom' and kor-gó 'sack' after the imperative verbs kɔ 'give' and zá 'bring'.

- (6) a. kɔ sáa-ga 'give a broom'
 b. kɔ kor-gó 'give a sack'
 c. zá sáa-ga 'bring a broom'
 d. zá kór-'gó 'bring a sack'

If floating low tones persist to the phonetic level then essentially the same procedure which produces the downdrift observed in (5) will generate the downstep of (6d).

- (7) za kor-go za kor-go
 | | | | | |
 H L H → H L H

Another general feature worthy of mention is the extensive vowel elision operative in the language. The final vowel of a suffix is systematically deleted except before a major syntactic break such as a clause boundary or of course pause. Thus, while a noun shows its final vowel in the citation form, this vowel is generally absent when the noun is situated in a sentence. To illustrate, consider the associative constructions in (8) built from the elements: néd-a 'man', ngá-bá 'chief', sáa-ga 'broom', and kor-gó 'sack'. The downstep in (8a) illustrates the phenomenon of tonal

stability. Even though the final syllable of néda has syncopated, its low tone persists to the phonetic surface, where it triggers a downstep of the following high tone (8e).

- (8) a. néd [!] sáaga 'man's broom'
 b. néd korgó 'man's sack'
 c. neeb sáaga 'chief's broom'
 d. neeb kórigó 'chief's sack'

e. néda saaga néd saaga
 | | | | | | |
 H L H L → H L H L

f. i. néda korgo ii. néd korgo
 | | | | | | |
 H L L H H L L H

The form néd korgó of (8b) raises some important questions concerning the notion of adjacency in the formulation of phonological rules defined on autosegmental representations. The question is why the high tone of the first syllable does not spread to the initial syllable of the following noun korgó to produce the ungrammatical *néd kórigó. There are a number of possible answers. The least interesting simply stipulates that high-tone extension applies before elision. Given this ordering, the rule is defined on the representation in (8f i); spreading of the high is blocked by the autosegmental ban on crossing association lines. However, simply to stipulate such an ordering claims that we have no more reason to expect the the grammatical néd korgó than the ungrammatical *néd kórigó. Yet there is good reason to believe that, in a configuration such as that of (9a) below, a rule spreading a high tone to the right will be blocked universally by the intervening low tone, despite the lack of an association line to invoke the line-crossing prohibition.

- (9) a. V V
 | |
 H L L

We shall present an example later from Lama. Additional cases of this form are reported by Stewart (1983) for Adloukrou and by Armstrong (1968) for Yala Ikom. In all these languages floating low tones are postulated in order to trigger a downstep. These languages also have rules extending a high

tone to the right. But in a configuration such as (9a) the intervening floating low regularly blocks the rightward spread of the high tone.

We must thus seek an explanation for why an intervening floating tone characteristically blocks tonal extension across its path. We may understand this by extending the notion of "adjacency" in autosegmental representations developed by Myers (1988:5). "Two elements are adjacent iff no element intervenes on the same tier between them or the elements they are associated with". If the Moore tone sandhi rule is understood as one which establishes a link between the first syllable of a word and a left-adjacent high tone, then the rule will fail to apply in representation (8e ii) since the high tone will not be adjacent in the relevant sense; rather the intervening floating low tone is the one that is "adjacent" to the second vowel. With this understanding of adjacency we thus need not stipulate an ordering between the high tone extension rule and elision. The former will be blocked in the derivation of néd korgó even if elision applies first.

One more preliminary feature of Moore worthy of mention here is the noun+adjective construction. In this collocation the suffix marking number for the whole NP is realized on the adjective and not on the head noun. Moreover, the lexical realization of the number element is determined by the adjective and not the noun. To illustrate these points, consider the grammar of phrases composed of the noun kor-gó sg., kor-dó pl. 'sack' and the adjective kéé-gó sg., kéé-sé pl. 'green'. 'A green sack' is expressed as kor kéé-gó in Moore. The plural 'green sacks' is kor kéé-sé. There is no agreement between the noun and the adjective, not the noun (*kor-gó kéé-gó) and the number element is realized on the adjective, not the noun (*kor-gó kéé, *kor-gó kéé-gó). Finally, if two adjectives modify the head noun, then the number marking appears on the final adjective: kor kéé béd-a 'big green sacks'.

The noun+adjective construction is significant because the head noun lacks the number suffix. We now have the ingredients for an interesting test of the two alternative tonal analyses with which we began the discussion. The first analysis claims that the low-high tones of kor-gó and the high-low tones of sée-gó are properties of the respective roots. The second analysis claims that the roots have simple low and high tones, respectively; the second tone is a lexical feature of the suffix that is subject to the polarity principle. When these nouns are followed by an adjective the two analyses make different predictions about the number of tones that should be found in the representations. The paradigm in (10) follows straightforwardly from the second analysis. The relevant underlying representations are given in (11).

- (10) a. kor bēda 'big sacks'
 b. kor kǝǝgǝ 'green sack'
 c. sá bēda 'big brooms'
 d. sá kǝǝgǝ 'green broom'

- (11) a. kor bēd-a b. kor kǝǝ-gǝ c. sa bēd-a d. sa kǝǝ-gǝ
 | | | | | | | | | | | |
 L H L L L H H H L H L H

The high tone extension rule will spread the high tone of [sá] in (11d) to the following syllable, creating the downstep found in (10d). In the first analysis, on the other hand, the relevant underlying forms will be those of (12).

- (12) a. kor bēd-a b. kor kǝǝ-gǝ c. sa bēd-a d. sa kǝǝ-gǝ
 | | | | | | | | | | | |
 L H H L L H L H H L H L H L L H

Here the unassociated tones must be prevented from having any material effect. In particular, we do not want the floating low in (12c) to trigger a downstep. Furthermore, we cannot assume that the high of sá has spread to the first syllable of bēda and in the process "gobbled up" the floating L (as in (13)). Application of the rule would be blocked in this case, given the sense of adjacency invoked earlier.

- (13) a. sa bēd-a sa bēd-a
 | | | | / | |
 H L H L → H L H L

A final problem with the initial analysis is that the high-extension rule would have to be restricted to linked tones. It is crucial that the putative floating high tone in (12b) not spread to the following adjective lest *kor kǝǝgǝ be derived. We have not found it necessary to distinguish between associated and unassociated tones in the analysis so far; the fact that such a distinction would be required here is an additional reason to doubt the original premise on which this analysis is based--that the tone of the suffix originates as a property of the root.

To briefly summarize the discussion to this point, we have examined two analyses for the high-low and the low-high nominal tone patterns of Moore. One analysis construes these patterns as HL and LH melodies of the root realized on the disyllabic "text" composed of the root plus the suffix. The

second analysis posits simple high and low-toned roots and a polar tone for the suffix. The noun+adjective construction argues that the roots have just a single tone and thus support the second analysis. But Moore also has a third tonal pattern of high on both the root and the suffix. How can this pattern be accommodated by our polar tone analysis?

2. Alternating stems

Let us now return to the analysis of nominals with a high tone on both the stem and the suffix. We list some additional examples in (14).

(14)	sg.	pl.	
	móo-gó	móo-dó	'straw'
	tóo-gó	tóo-dó	'expensive'
	bùu-gá	bùu-sé	'goat'
	rúm-gá	rúm-sí	'animal'
	kúu-ré	kúu-é	'old'
	ráa-ré	ré-yá	'day'
	pág-á	pág-bá	'woman'

These stems are anomalous in that they fail to exhibit tonal polarity. However, simply to consider them lexical exceptions to the polarity principle is not an acceptable analysis--for at least two reasons. First, this pattern appears to be as robust as the low-high and high-low ones. Second, if the stems of (14) are treated as having high tones that exceptionally fail to polarize the suffix, it would remain unclear why there are no low-toned stems that behave in the same way. Absence of the low-low pattern is a glaring gap that should be explained. While it is clear that the stems of (14) cannot have a simple high or low tone (under the polarity analysis), there is a third option available in the autosegmental framework--toneless. Just as elements of the tonal tier may be unassociated with the segmental tier, so autosegmental phonology has found it necessary to postulate stems and/or affixes which lack an inherent specification on the tonal tier. For example, in many Bantu languages verbal stems fall into two classes--high and toneless. We might thus postulate the underlying representations in (15) to distinguish among the three-way tonal contrast found in Moore stems such as kor-gó, saa-ga, and baa-gá.

(15)	kor	saa	baa
	L	H	

We must now explain how the toneless stem acquires its high tone. While we might postulate a rule to assign toneless elements a high, Pulleyblank (1986) has shown that the default tone in a high-low system is typically low. There is consequently only one other possible source for the high tone in báa-gá---the suffix. We might thus postulate that the tone of báa-gá arises in two steps, as depicted in (16a). First, the tone of the suffix is mapped to the left-most open position. We then postulate a rule which links a toneless syllable to the high tone of the preceding syllable. We state this rule in (16b).¹

- (16) a. báa-ga báa-gá báa-gá
 H → H → H
- b. V (V)
 |
 H

This analysis thus claims that báa-gá has a single, multiply-linked high tone and that this tone is a property of the suffix. The noun-adjective construction provides a significant test of the validity of this analysis. Recall that the head noun lacks a number suffix in this construction. If the high tones of báa-gá originate from the suffix then the bare stem will be exposed in the noun-adjective construction. It should appear with a default tone, which is low in a two-tone system. This line of reasoning thus leads to the prediction that the stems of (14) will appear low-toned in the noun-adjective construction. The data in (17) illustrate the generalization of Moore phonology that nominals in the high-high pattern systematically assume a low tone in this construction--a striking confirmation of the analysis. (Recall from (10) that roots with a simple high or low such as [sá] 'broom' and [kor] 'sack' remain unmodified in this context.)

- (17) móo-gó 'straw' mo sangó 'good straw'
 rúm-gá 'animal' rum sangó 'good animal'
 wám-dé 'calabash' wam kǝǝgá 'green calabash'
 báa-sé 'dogs' ba béda 'big dogs'
 míu-gú 'red' ba mi béda 'big red dogs'

One implication of this analysis of the alternating (toneless) roots is that the number suffixes must all be underlyingly high-toned. They are the source of the root high in the high-high tonal pattern, and this pattern populates every noun class.² But if we accept the assumption that all number suffixes have an underlying high tone, then the polarity phenomenon may be reduced to the presence in the grammar of the widely-attested and better understood process dissimilating two successive high tones (cf. Meeussen's rule in Bantu).

(18) H → L / H ___

Accordingly, we assume the derivations in (19) for the three Moore tonal patterns found in kor-gó, sáa-gá, and báa-gá. In the first step the UG association convention assigns the tones from left-to-right--in particular the tone of the suffix is assigned to the toneless root. In the next step a toneless suffixal vowel assimilates to the tone of the root. Finally, high-tone dissimilation (18) applies to lower the suffixal tone in sáa-gá. This rule fails to apply in báa-gá because, although báa-gá has two successive high-toned syllables, its representation differs from sáa-gá in having just one high tone spread over both syllables.

(19)	[kor] go L H	[saa] ga H H	[baa] ga H	
	kor go L H	saa ga H H	baa ga H	UG Association Convention
	inappl.	inappl.	baa ga / H	tone-spread
	inappl.	saa ga H L	inappl	H-dissimilation (18)

The Moore data thus suggest that the polarity phenomenon can be reduced to the better understood dissimilation rule of (18). The elimination of tonal polarity as an independent phonological process implemented by an alpha-switch rule such as (4b) that reverses the feature values for $[\pm\text{H}]$ is a welcome result in any case. Such processes are anomalous in the autosegmental framework, where tonological rules characteristically spread, delink, or delete tones. In this regard, it is interesting to note a striking parallel to the Moore state of affairs in the Chadic language Margi (Hoffmann 1963, Pulleyblank 1986), another tonal system in which toneless roots and polar affixes cooccur. Like Moore, Margi has a number of affixes with polar tone. More importantly, Margi, again like Moore, has a three-way contrast among high, low, and toneless stems. The latter alternate between high and low depending on the local tonal context. For our purposes, the most important point is that the alternating, toneless stems systematically

reflect a high tone when they combine with a polar affix. As in Moore, the Margi data suggest that the polar tones are basically high and that the polarity phenomenon arises from the dissimilation of adjacent high tones.

Although more cases of polarity need to be studied from this perspective, the Moore data and the Margi parallel lead us to conjecture that 1) there is no tonal polarity as such, that 2) polar tones are underlying high tones, and 3) the effect of polarity is the reflex of a rule dissimilating successive high tones. The claim that polar tones are basic high tones precludes the existence of a system otherwise like Moore but where a member of the alternating class of stems would appear with a low rather than with a high tone when it combines with a polar-toned affix. That is to say, we predict the absence of a language Moore' where [bae-gə] instead of [bae-gá] would be found beside [sae-gə] and [kor-gó]. Under our interpretation of polarity, Moore' would require the suffix [gə] to have an underlying low tone that would map to the toneless root by the initial association conventions and dissimilate to high after a low-toned root.

If the prediction that such systems as Moore' will not be found proves to be true, then the explanation probably lies in the relative unnaturalness of a rule dissimilating successive low tones in a two-tone system.³ In such systems high tone is typically the active value, the one in terms of which rules of assimilation, dissimilation, and deletion tend to be defined. In this respect low tone parallels the second member of the aspirated-unaspirated opposition: dissimilation of aspirated consonants (eg. Grassmann's Law) is natural. But dissimilation of unaspirated ones would be quite unusual.

3. The associative construction

To briefly summarize the results of the previous section, we have proposed an analysis for the three nominal tonal patterns of Moore in which toneless stems such as báa-gá receive their high tone from the suffix via the UG left-to-right association convention and a spreading of the tone to the suffix. Given this analysis, we expect such nouns to show a constant high tone, other things being equal. In general, this expectation is confirmed. In (20) we cite examples of nominals as subject to the copular yaa, and first or second object to the verbs zá 'bring' and kə 'give'. In each case báa-gá has a stable high tone.

- (20) a. báag yáa 'dog is'
 sáag yaa 'broom is'
 korəg yáa 'sack is'

- | | | | | |
|----|----------------|------------------------|----------|----------------|
| b. | zá báagá | 'bring a dog' | kɔ báagá | 'give a dog' |
| | zá sáage | 'bring a broom' | kɔ sáage | 'give a broom' |
| | zá kór!gó | 'bring a sack' | kɔ korgó | 'give a sack' |
| | | | | |
| c. | kɔ nɛd ! báagá | 'give a man a dog' | | |
| | kɔ nɛd ! sáage | 'give a man a broom' | | |
| | kɔ nɛd korgó | 'give a man a sack' | | |
| | | | | |
| | kɔ naab báagá | 'give a chief a dog' | | |
| | kɔ naab sáage | 'give a chief a broom' | | |
| | kɔ naab kór!gó | 'give a chief a sack' | | |
| | | | | |
| | kɔ pág báagá | 'give a woman a dog' | | |
| | kɔ pág sáage | 'give a woman a broom' | | |
| | kɔ pág kór!gó | 'give a woman a sack' | | |

Also when a toneless root is the first element of an associative construction it consistently appears with a high tone. The paradigms in (21) with the root pág-á 'woman' (cf. pog son-gó 'good woman') illustrate this point.

- (21) pág sáage 'woman's broom'
 pág kór!gó 'woman's sack'

All of the data in (20) and (21) can be accounted for simply by assuming that the phrase-level rules of elision and high-tone extension apply after the initial association and spread of the high tone from the number suffix to the toneless root--presumably a lexical process. For example, the phrase pág kór!gó 'woman's sack' receives the derivation in (22).

- (22) pág-ə kor-go pág kor-go
 |/ | | |/ |
 H L H H L H

There is, however, one context where the toneless nominal takes a different tonal shape from what we otherwise expect--when the noun heads an associative construction. Consider the associative paradigms in (23) showing all nine possible combinations of the three basic tonal patterns.

- (23) nɛd-ə 'man', naab-á 'chief', pág-á 'woman', báa-gá 'dog', kor-gó 'sack',
 sáa-ge 'broom'

- a. néd baagá 'man's dog'
 naab báa!gá 'chief's dog'
 pág báa!gá 'women's dog'
- b. néd korgó 'man's sack'
 naab kór!gó 'chief's sack'
 pág kór!gó 'women's sack'
- c. néd !sáaga 'man's dog'
 naab sáaga 'chief's broom'
 pág sáaga 'women's broom'

A nominal in the high-high pattern such as báa-gá systematically takes a low tone when preceded by a high-low noun such as néda and an internal downstep when preceded by a noun that terminates in a high tone. The paradigm in (23b) shows that a low-toned stem such as [kor] has the same tonal pattern in this context. We can account for the behavior of the high-high noun báagá by assigning the root a low tone in this context. The problem is to explain the origin of this low tone.

One analysis simply postulates a special rule that delinks the first of two multiply-linked syllables in the head of an associative construction. The result is a toneless syllable which will be assigned a low by the default rule.

- (24) báa-ga → báa-ga → báa-ga
 | | | |
 H H L H

While quite simple to state, this solution lacks any motivation. Why should the first syllable delink rather than the second? Why only in this particular grammatical construction?

Since the low tone on báagá only appears in the associative construction, and since associative constructions often contain a tonal particle, we might pursue the hypothesis that the low tone is a grammatical particle marking this particular construction. Although the syntax would suggest that the particle marks the preceding complement (like the -s of the man's house), it must group phonologically with the following noun. Such syntactic-phonological disparities are not unprecedented, however, (eg. the man's coming) and so should not prevent us from exploring this

approach to the problem. Given that the tonal particle is proclitic to the head noun, a toneless root such as [baə] will have the representation of (25).

- (25) a. [baə] ga
 L H

So long as the particle comes up on the same cycle as (or a cycle that precedes) the suffix, simple left-to-right matching of tones and tone-bearing units will assign the low of the particle to the root syllable, merging the contrast between toneless roots like [baə] and low roots like [kor].

While postulation of the tonal particle provides a satisfactory answer for the toneless roots, it is problematic for the low and high-toned roots. We expect the underlying representations of (26) for the associative phrases pəg kór 'woman's sack' and pəg sáagə 'woman's broom'.

- (26) a. [pəg-a] [kór-go] b. [pəg-a] [səə-go]
 |/ | | |/ | |
 H L L H H L H L

Given the definition of adjacency invoked earlier, the unassociated low particle should block spread of the high tone from pəg and trigger the downstep of a following high tone. We thus incorrectly predict *pəg kór and *pəg sáagə. The postulated low-tone particle thus must be removed by the time these phrase-level rules apply--perhaps by an application of stray erasure at the end of the lexical phonology. We unfortunately have no independent evidence for this step and thus must admit that this aspect of the analysis remains problematic. We shall see that the associative construction in Lema presents a similar alternation. But in Lema the evidence for the low-toned particle is more substantial.

4. Some rules of Lema tonology

Lema is a Gur language spoken by some 60,000 persons in Northern Togo. Previous work on the language has included a brief but valuable grammatical sketch by Prost (1964). As far as we know, the tonology of the language has never been described before. In this section we discuss some of the major tonological processes we have uncovered. Later sections discuss some reflexes of tonal polarity in Lema and the alternations that arise in the associative construction.⁴

Lama has three surface tones on a syllable spoken in isolation: a high (eg. ná 'see!'), a low (eg. na 'with'), and a fall (eg. náa 'cow'). As in Moore, we transcribe the tone of the syllable on the first half of a geminate vowel. Our work has focused primarily on the nouns. There are some ten noun classes in Lama. The first is unaffixed while the remaining are marked by a suffix which is rather transparently related to the corresponding pronoun that stands for the noun. Nouns drawn from the first nominal class denote kin and other persons as well as a few animals. Class-2 forms the corresponding plurals. The suffix is -ná, with the -n missing after many consonants. Monosyllabic stems appear in the four phonologically distinct tonal classes tabulated in (27).

(27)	class 1	class-2	
a. low ₁	ci	ciná	'father'
	ri	riná	'mother'
	kɔ	kɔná	'sister'
	rə	raná	'friend'
b. high	wáaɪ	wáaɪá	'husband'
	yír	yírá	'person'
	wán	wániná	'husband's mother'
	wól	wólá	'daughter-in-law'
	léel	léelá	'widow'
	yélém	yélémɔ	'blind person'
	yédám	yédámɔ	'co-wife'
c. fall ⁵	táa	táan	'antelope'
	náa	náan	'cow'
	síi	síin	'sheep'
	tíi	tíin	'elephant'
d. low ₂	yal	yalá	'wife'
	apal	apalá	'man'
	reel	reelná	'brother'
	afəl	afəlá	'son'
	reen	reennɔ	'cousin'
	nun	nunná	'aunt'

Although the nouns in (27a) and (27d) are tonally identical in isolation--both are realized as low--they systematically differ in their phonological behavior. Furthermore, the contrast between high (27b) and fall (27c) is

realized directly only before pause. When a noun from the latter group is placed before another word in the phrase it appears with a simple high tone. The four tonal classes thus reduce to a simple high versus low opposition in the phrase. However, their effect on the tone of the following word is such that a four-way phonological contrast is maintained before a word that begins with a simple low in isolation (eg. sewá 'ran', té 'under') and is reduced to a three-way contrast before a high tone (eg. té 'chez'), since low₁ and low₂ nouns do not contrast in this environment.

(28)	low ₁	ci	'father'		
	high	wáal	'husband, man'		
	fall	náa	'cow'		
	low ₂	yal	'woman'		
	sewá	'ran'		tẹ	'under'
	ci sewá	'father ran'		ci tẹ	'under father'
	wáal sé'wá	'man ran'		wáal tẹ	'under man'
	náa sewá	'cow ran'		náa tẹ	'under cow'
	yal sé'wá	'woman ran'		yal tẹ	'under woman'
	tẹ	'at, chez'			
	ci tẹ	'chez father'			
	wáal tẹ	'chez man'			
	náa tẹ	'chez cow'			
	yal tẹ	'chez woman'			

Like Moore, Lama has the rule which extends the domain of a high-tone one syllable to the right. When the following syllable contains a low, a falling tone results. This high-tone extension operates in a variety of grammatical contexts.

(29) a. associative construction

wáal	'husband'	y(r)	'person'
ci	'father'	rá	'friend'
wáal ci	'husband's father'	y(r) rá	'person's friend'

b. verb+object

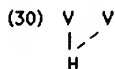
ná	'see!'	cf.	sɿ	'take!'
ri	'mother'		sɿ ri	'take mother'
ná ri	'see mother'		sɿ wáal	'take husband'

c. noun+postposition

tẹ 'under'

wáal tẹ 'under husband' cf. ci tẹ 'under father'

We shall account for these alternations by the rule in (30).

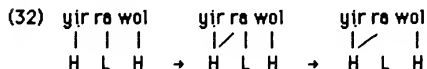


Unlike in Moore, where the extension of high tone only operates between words, this rule applies within the word as well in Lama. We return to this point shortly.

The falling tone that arises from high-tone extension only surfaces prepausally. In other positions a fall simplifies through the delinking of its low-tone component. This process applies not only to falling tones derived from high tone extension but also to underlying falling tones (31c).

- (31) a. wáal 'husband', ci 'father'
 wáal ci 'husband's father'
 wáal ci sewá 'husband's father ran'
- b. yír 'person', ra 'friend'
 yír ra 'person's friend'
 yír ra[!] wól 'person's friend's daughter-in-law'
- c. nãa 'cow' nãa tẹ 'under cow'
 nãa sewá 'cow ran' nãa[!] tẹ 'chez cow'

High tones are realized at a lower pitch value after both overt low tones (downdrift) as well as after simplified falling tones (downstep). We assume that, as in Moore, a floating low tone initiates a downstep. (31b) thus has the derivation of (32). In the first step, the high tone of yír spreads to the low of ra. The resulting falling tone simplifies through the disassociation of the low, which activates a phonetic downstepping of the high tone on wól.



Note that the floating low tone that results from simplification of the fall in *nâa* 'cow' (31c) not only triggers a downstep in *nâa* ' *lê* 'chez cow' but, under the sense of adjacency invoked earlier in our discussion of Moore, also helps to block extension of the high tone in *nâa sewâ* 'cow ran'.

In contrast to high tones, the low tone in Loma is generally inert. After a low, high tones remain unchanged in most contexts.

(33) a. preposition

na 'with', *ra* 'friend', *wâel* 'husband'
na ra 'with friend'
na wâel 'with husband'

b. verb

sü 'take' imper., *ci* 'father', *yír* 'person'
sü ci 'take father'
sü yír 'take person'

c. negative

ya 'no', *ri* 'mother', *wâel* 'husband'
ya ri 'no mother'
ya wâel 'no husband'

There is, however, one notable exception to this statement. When it occurs in the head noun of an associative construction, a high tone appears to lower after a preceding low. We return to this phenomenon later.

(33) d. associative

<i>ri wâel</i> 'mother's husband'	(cf. <i>wâel</i> 'husband')
<i>ci wol</i> 'father's daughter-in-law'	<i>wól</i> 'daughter-in-law'
<i>ra yâdâm</i> 'friend's co-wife'	<i>yâdâm</i> 'co-wife'

Let us now consider the nouns in (27d). Although they are low in isolation they consistently differ from the elements of (27a) both in their effect on a following tone and in the way in which they are affected by the preceding tonal context. As we see in (34), these nouns have the same effect as the high-toned nouns of (27b) in producing a fall or a high plus

downstep on a following low-toned syllable. They thus differ from low₁ nouns such as ra 'friend' which do not have this effect.

- | | | | |
|------|-----------------------------|-----|-----------------------------------|
| (34) | yəl 'wife', sewá 'ran' | cf. | wáəl 'husband' |
| | yəl sé'wá 'wife ran' | | wáəl sé'wá 'husband ran' |
| | | | ra sewá 'friend ran' |
| | raəl 'brother', ra 'friend' | | wól 'daughter-in-law' |
| | raəl rá 'brother's friend' | | wól rá 'daughter-in-law's friend' |
| | | | ra raəl 'friend's brother' |
| | tə 'under' | | wáəl tə 'under husband' |
| | yəl tə 'under wife' | | ra tə 'under friend' |

Clearly, low₂ nouns such as yəl 'wife' and raəl 'brother' must contain a high tone in their underlying representation. Since we have already postulated low (eg. ra 'friend'), high (eg. wáəl), and HL (eg. náə 'cow') nouns, a LH sequence seems the most likely solution.⁶ Other things being equal, we would posit the representation of (35a) over that of (35b).

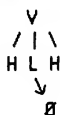
- | | | |
|------|--------|--------|
| (35) | a. yəl | b. yəl |
| | | \ |
| | L H | L H |

So long as the high-tone extension rule is permitted to affect both associated and unassociated tones, it would appear that (35a) leads to a simpler grammar. Why postulate attachment of the high in (35b) if we must only remove it later? The problem is that with (35a) it becomes difficult to explain the behavior of the low₂ nouns when they are preceded by a high tone. As the data in (36) show, they regularly appear with a simple high tone in this environment. In particular, no downstep is produced.

- | | | | |
|------|-------------------------------------|-----|---------------------------------|
| (36) | yəl 'wife' | | |
| | wáəl 'husband' | | |
| | wáəl yəl 'husband's wife' | | |
| | wáəl yəl sé'wá 'husband's wife ran' | | (* wáəl yəl [!] sé'wá) |
| | ná 'see', yəl 'wife' | cf. | ra 'friend' |
| | ná yəl 'see wife' | | ná rá 'see friend' |
| | raəl yəl 'brother's wife' | cf. | yəl rá 'wife's friend' |
| | yəl raəl 'wife's brother' | | |

If the low₂ nouns are represented with a rising tone as in (35b), then the simplification we see in (36) is very easy to state. We may formulate the rule of (37a) to delete the middle tone in a marked, triply-linked structure. With the help of this rule, we have the derivation of (37b). In the first step high tone extension applies, followed by (37a) eliminating the low sandwiched between the two highs. Subsequent simplification of the falling tone gives wáal yáal sé!wá.

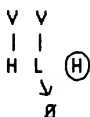
(37) a.



b. wáal yal sewa wáal yal sewa wáal yal sewa
 | | | | | / | \ | | | / | / | |
 H L H L H → H L H L H → H H L H

However, if the low₂ nouns are given the representation of (35a), then we require the rather unnatural rule of (38a) below.

(38) a.



b. wáal 'husband', ci 'father', sêe runs
 wáal ci! sêe 'husband's father runs'

This rule must crucially apply before high-tone extension. Otherwise the floating high would become associated and the low₂ nouns could not be distinguished from a normal HLH sequence, which does yield a downstep. Compare in this respect (38b,c) where the spreading high produces a floating low on ci 'father' that does downstep the following HL sequence on sêe. Aside from lacking any particular phonetic motivation, with its reference to the high on the left this rule repeats part of the high-tone extension rule. Furthermore, it is the only rule we have discovered so far which would have to crucially refer to an unassociated tone (indicated by the circle on the rightmost high). To this point in the analysis, all rules have treated associated and unassociated tones the same. For these reasons we shall analyze the low₂ nouns as having an underlying LH rising tone. A rule, perhaps a generalization of the rule simplifying falling tones, delinks the second portion before the phonetic surface is reached.

To summarize the analysis to this point, we posit four underlying tones on monosyllabic roots: low, high, falling, and rising. We also posit a general H-spread rule extending the domain of a high-tone to the right. Simplification processes eliminate the righthand links in contour tones. A special rule deletes the L portion of a postulated rising tone that has undergone H-spread. Finally, high tones are phonetically implemented at a lower pitch value after both associated and unassociated lows.

5. Traces of tonal polarity in Lama

Unlike in Moore where essentially every noun-class suffix has tonal polarity, the phenomenon is much more restricted in Lama. Only a few suffixes show traces of polarity. Most do not alternate in tone. Furthermore, this polarity can only be detected once the effect of several phonological rules is removed.

Below we list nouns drawn from the paired third and fourth and the fifth and sixth noun classes. The singular class-3 and 5 suffixes show a three-way tonal alternation while the corresponding class-4 and 6 plural suffixes have a constant falling tone. When combined with a monosyllabic root we find three surface tonal patterns in classes 3 and 5: a low on both the root and the suffix (eg. [wur-u] 'net', [wun-o] 'river'), a high on the root and a fall on the suffix (táp-ú 'forest tree', wúr-ó 'chief'), and a high on both the root and the suffix (eg. sám-ú 'bat', wúr-ó 'hill'). The existence of three tonal patterns immediately reminds us of Moore. But we claimed earlier that a low-low pattern would be systematically absent from a polar system. If this is correct then the low-low pattern must be a surface effect that arises from some other tonal representation. This reasoning is corroborated by the fact that nouns in the low-low pattern consistently induce a high tone on the following word (like yal 'woman' discussed above): eg. té 'under', but wuru té 'under net'; sewá 'ran', wun-o sé'wá 'river ran'. Consequently, we assume that these nouns derive from a low-rise representation. We have indicated this rising tone in our transcriptions but warn the reader that this is a phonological spelling. Phonetically, the final syllable is always low in tone since Lama lacks surface rising tones.

(39) Class 3-4

	sing.	pl.	
a.	carũ	carêñ	'star'
	resũ	resên	'big pot'

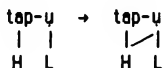
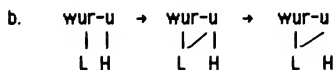
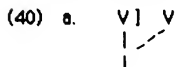
	wurũ	wurân	'net'
	kperũ	kperân	'ladder'
	kpeĩũ	kpeĩân	'hawk'
	kpeđũ	kpeđên	'walking stick'
	kọọsũ	kọọsân	'flute'
	nembũ	nembân	'room'
	mandũ	mandân	'bamboo gun'
	nəwũ	nəwân	'bull'
	rĩsũ	rĩsân	'soul'
b.	támũ	támân	'gourd plant'
	kómũ	kómân	'kapok tree'
	sémũ	sémân	'nut tree'
	télũ	télân	'baobab tree'
	tápũ	tápân	'forest tree'
	kpásũ	kpásân	'acajou tree'
	kpásũ	kpásân	'cough'
	rémũ	rémân	'pot for salt'
	háamũ	háamân	'arm'
	lákũ	lákân	'jaw'
	cúkũ	cúkân	'patio'
	célũ	cên, cėlân	'wing'
	kólũ	kôn, kólân	'tree sp.'
	səlũ	sên, səlên	'tree sp.'
c.	cémũ	cémân	'hen'
	lákũ	lákân	'big stick'
	lúrũ	lúrân	'millet stick'
	kpêrũ	kpêrên	'bridge'
	wúrũ	wúrân	'vegetable sp.'
	səmũ	səmân	'bat'
	káasũ	káasân	'crocodile'
	lêməũ	lêməân	'lemon'
	sáarũ	sáarên	'sword'
	nândũ	nândên	'gigot'
	cəlũ	cên, cəlên	'tree sp.'
	yəlũ	yên, yəlên	'horn'

class 5-6

a.	wunõ	wunõsâ	'river'
	wonkõ	wonkásâ	'donkey'

	hɔndɔ̃	hɔndásê	'moon'
	səlɔ̃	səlɔ̃sê	'couvercle'
	wərɔ̃	wərásê	'money'
	wɪtɔ̃	wɪtásê	'word'
b.	wúrɔ̃	wúrásê	'chief'
	lésɔ̃	lésásê	'soul'
	tɔpɔ̃	tásê	'cour'
	hɔ̃	hásê	'dog'
c.	wúró	wúrásê	'hill'
	kpácɔ̃	kpácásê	'scorpion'
	təmɔ̃	təmásê	'loins'
	wúnɔ̃	wúnásê	'year'
	kpásɔ̃	kpásásê	'mat'
	trɔ̃	trásê	'star'

For classes 3 and 5 there thus are just three tonal patterns for monosyllabic roots: low on the root and a rising tone on the suffix, high on the root and a fall on the suffix, and finally a high on both the root and the suffix. Only a little imagination is required to relate this three-way contrast to the one we saw operating in Moore. The high-fall pattern can be derived from a high-low one via a generalization of the high-tone extension rule to apply between the root and the number suffix. (This captures a wider generalization in Loma: a simple low-toned syllable may not in general follow a high.) Similarly, we may derive the low-rising pattern of wur-ǔ and wun-ǔ from an underlying low-high by postulating a special rule that spreads a low tone across the boundary between the root and the suffix. We state this rule in (40a). The proposed derivations of wur-ǔ 'net' and táp-ǔ 'tree' are sketched in (40b).



The result of this reconstruction is a tonal system isomorphic to the Moore one discussed earlier: low-high, high-low, and high-high. The Moore analysis invites us to derive the high-high tonal pattern of sám-ú 'bat' and wúr-ó 'hill' from an underlying toneless root plus a high-toned suffix. Some striking support for this inference is to be found in the Lama associative construction.

5. The associative construction in Lama

As in Moore, a special tonal change affects a noun when it heads an associative construction. When viewed purely from the surface the tonal changes appear much more radical in Lama. We illustrate with class-3 nouns drawn from each of the three tonal patterns. In (41a,b) we cite these nouns in context after low and high tones, respectively. In this case the only rule of note is high-tone extension which spreads the tone of ná 'see' to the initial syllable of kpélu 'hawk'. But in the associatives of (41c) both high tones of sámú change to low while only the initial high-toned syllable in tápú does. (41d) shows an additional application of high-tone extension initiated by the high tone on wáel.

(41)

sám-ú 'bat'	kpélu 'hawk'	táp-ú 'tree'
a. na sámú 'with bat'	na kpélu 'with hawk'	na tápú 'with tree'
b. ná sámú 'see bat'	ná kpélu 'see hawk'	ná tápú 'see tree'
c. ci sámú 'father's bat'	ci kpélu 'father's hawk'	ci tápú 'father's tree'
d. wáel sámú 'man's bat'	wáel kpélu 'man's hawk'	wáel tápú 'man's tree'

Before proceeding further with the analysis we must note that the low-low shape assumed by the high-high nouns such as sámú derives from an intermediate low-rise representation. This is shown by the paradigm in (42); sámú continues to induce a high tone on a following word such as sewá 'ran' when it heads the associative.

(42) ci sámú sé'wá 'father's bat ran'
 wáel sámú sé'wá 'husband's bat ran'

Suppose that we borrow two features of the analysis of the associative proposed for Moore: that the associative is marked by a low-tone particle and that the nominals in the high-high tonal pattern derive from toneless roots. This implies the representations in (43a). (We assume the root tone

has already associated). Association of the particle to the toneless root yields the representation in (43b). Then high tone dissimilation polarizes the suffixal high to low in [tap-ɥ] (43c). So far everything is the same in the two systems. But one respect in which Lama differs from Moore is the low-spread rule (40a). Suppose that this rule not only applies between the root and suffix but also between the proclitic particle and the root. The result is the representations of (43d).

(43)	a.	[səm] ɥ	[kpəl] u	[tap] ɥ	
		L H	 L L H	 L H H	
	b.	səm ɥ	[kpəl] u	[tap] ɥ	Assoc. Conv.
		 L H	 L L H	 L H H	
	c.	inəppl	inəppl	tap ɥ	H-dissim
				 L H L	
	d.	səm ɥ	kpəl u	tap ɥ	L-spread
		/ L H	/ L L H	/ L H L	
	e.	inəppl	inəppl	tap ɥ	H-extension
				/ L H L	
	f.	səm ɥ	kpəl u	tap ɥ	rise simpl
		/ L	/ L	/ L H L	

In the next step high extension applies to derive the falling tone on the suffix in təp 'tree'. The derivation is completed in (43f) by delinking the high tone component of the rising tones.

We have thus been able to explain the lowering found in the associative construction by postulation of a low-tone particle. This particle surfaces in a wider range of contexts in Lama in comparison to Moore due to the former language's low-spreading rule, a rule that is missing in Moore. In other respects, the two tonal systems are remarkably similar. Given the

geographic distance separating the two languages, one wonders whether the associative lowering was not a feature of the Proto-language. Much further study of the tonology of the Gur languages is required before this conjecture can be answered one way or the other. We hope that this paper will stimulate further study of the tonal structure of Gur languages.

NOTES

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¹It is also possible that the high tone is lexically associated to the suffix and spreads leftwards to the toneless stem. For our purposes the important point is that the stem is toneless and acquires its tonal specification from the suffix.

²Tonal systems are often organized in such a way that all affixes in a given category have the same tonal specification. For example, in many Bantu languages the noun prefixes are always low-toned.

³The low-tone raising rule of Hausa discovered by Leben (1971) is a well-known exception.

⁴See Ourso (forthcoming) for a fuller discussion of Lama phonology.

⁵In the plural these nouns belong to class-4, not to class-2. See Yu (1988) for discussion.

⁶It is interesting to note that low₁ and low₂ nouns differ in segmental shape as well. The latter contain a consonantal coda while the former have a simple CV shape. Lama syllable structure is CV or CVC, with the coda position limited to sonorants. It is possible that historically the sonorant coda counted as a tone-bearing unit, thus permitting a noun such as ya to hold two tones. However, synchronically no surface rising tones occur in Lama.

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A FUNCTIONAL TYPOLOGY OF "ni" IN KIVUNJO (CHAGA)¹

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Abstract

This paper discusses the distribution and functions of a morpheme *ni* in Kivunjo, a language in the group of Chaga languages spoken in Tanzania. The paper argues that the distribution of *ni* in Kivunjo is compatible with its major function in Kivunjo discourse, namely "focus marking" and that it is not always morphologically or semantically determined as suggested by Dalgish (1978, 1979). Rather *ni* is phonologically an integral part of nouns especially those whose grammatical function is "subject". The paper also discusses the relationship between the distribution of this morpheme with the tonal patterns. The presence or absence of *ni* in a clause seem to influence the way tones are assigned to the tone bearing units. It is also argued that *ni* primarily indicates focus of assertion but when it combines with other operations (e.g. position in the sentence) or is replaced by tone, it marks contrastive focus.

1. Introduction

In his analysis of *ni* in Kivunjo,² Dalgish (1978&1979) notes that the morpheme *ni* occurs optionally before verbs. Nurse and Phillipson (1977) make note of a similar morpheme in Kimochi, a dialect which can be considered mutually intelligible with Kivunjo. While Dalgish designates the morpheme a *pre-verbal ni*, Nurse and Phillipson (1977) name it a *stabilizer*. In other Bantu languages³ in which a similar morpheme has been attested, it has been given a variety of names including "copulative particle," "predicative morpheme," and "stabilizing element." These references indicate that the morpheme may appear segmentally as *n* before a vowel-initial verb while it may be deleted before a consonant (with an optional length on the consonant) in a similar position. Marcel van Spaandonck (1973) notes that in many Bantu languages (e.g., Zulu, Shona, Shambaa) the morpheme may be realized on the surface structure (phonological) or on a deep-structure (semantic) level. Dalgish (1979:51) further notes that the morphosyntactic alternation involving the presence and absence of the *pre-verbal ni* (henceforth *pv-ni*) can be explained as a result of a semantic alternation between the parameters of:

- (a) assertion versus non-assertion.
- (b) positive versus negative force of yes-no questions.
- (c) the degree of certainty concerning the truth of a proposition that appears in a subordinate clause.

As stated in the abstract of this paper, I intend to show that the distribution of *ni* in Kivunjo is dictated by its focus marking function and that its presence or absence is not always morphologically or semantically determined.

The paper begins with a short discussion of the typology of this morpheme *ni*, then proceeds to look at the distributional patterns. Meanwhile I offer a hypothesis which may explain the restrictions associated with the distribution of the particle in different clause types. I argue that the distributional patterns reflect a distinction between assertive focus, contrastive focus and the lack of the need for focus marking in a given proposition.

These claims are consistent with generalizations that have been made about markers that are said to behave similarly in other languages. For example, Marchese (1983) identifies some particles in West Kru languages⁴ that resemble the Kivunjo *ni* in their function and distributional patterns. Marchese notes that these particles occur in affirmative declarative sentences and are excluded in negatives, imperatives and subordinate clauses. The particles may appear as an independent particle, a suffix attached to the verb, or merely as a high tone. Marchese further notes that these particles can be used as *focus markers* distinguishing focus of assertion from contrastive focus. As will be shown, these characteristics summarize the characteristics of the Kivunjo *ni*.

2. The typology of *ni*

Phonologically, *ni* may be realized as a variety of assimilated nasals—for example, a syllabic η before vowels (except the front high vowel [i]— η (velar) and \tilde{n} (palatal) before a consonant, and the front vowel [i]. Further, it may be totally assimilated when it occurs before another nasal. Otherwise it appears as *ni* especially before NPs at sentence initial (S-initial)⁵ position. The following examples show these possibilities.

(1)

- a. η - \ddot{u} - lé- kápá máná ukôu.
foc- sm-2sg- pst- beat child yesterday
“You beat the child yesterday.”
- b. η -kíté kí- lé- pfâ.
foc-dog- sm-cl7- pst- die
“The dog died.”
- c. \tilde{n} -tsíndó í- lé- m- lém- í- à.
foc-hump sm-cl10- pst- om- overcome appl. fv
“The hump was heavy on him”
- d. m̄fó -ú- lé- ráâ.
foc-river -sm-cl4- pst- smell bad
“The river smelled bad.”

- e. nì ñfó- ú- lé- ráà.
 foc river -sm-cl4- pst- smell bad
 "The river smelled bad."

This example shows η before vowels (1)a, η before a palatal (1)b, \bar{n} before a velar (1)c, total assimilation before another nasal (1)d, and as *ni* before an NP (1)e. Thus, (1)d and (1)e may be considered to be in free variation which can also be argued for (1)b, and (1)c but not (1)a for reasons that will be discussed later.

Although Dalgish distinguishes *pv-ni* from the *ni* found in other syntactic positions, I will argue that the two are functionally similar. I will claim that *pv-ni* is derived from *ni* which tends to cliticize onto the verb.

In his analysis, Dalgish (1979:48) posits morphosyntactic constraints for *pv-ni*. He claims that *pv-ni* cannot occur before vowels except the second and third person singular subjects, (u) and (a) respectively. Thus, *ni* cannot appear where agreement on the verb indicates an association with nouns from certain noun classes—in particular, classes whose concordial prefixes are vowels (e.g. class 3 and 9). Consider the following examples:

- (2)
- a. ñfó (n)- ú- lé- ráà.
 river foc- sm-cl3- pst- smell bad
 "The river smelled bad."
- b. ñfó (n)- í- lé- r'aa.
 river foc- sm-cl4- pst- smell bad
 "The rivers smelled bad."
- c. ùngányí (n)- ù- lé- m- kòoyà kàchà.
 bigness foc- sm-cl14- pst- om- find time before
 "Power found its way to him a long time ago."
- d. ñjófú (n)- ì- lé- pfa.
 elephant foc- sm-cl9- pst- die
 "The elephant died."

According to Dalgish, (2)a-d should be ungrammatical because the *pv-ni* is associated with the vowel-subject agreement markers for nouns from class 3 (example 2a), class 4 (example 2b), class 14 (example 2c), and class 9 (example 2d). Notice, however, that the () indicates that the morpheme may optionally appear. As will be shown later, the presence of the morpheme will indicate that the clause is semantically independent while its absence will indicate that it is semantically dependent on another clause or some previous discourse. Examples (3)a and (3)b below further illustrates this optionality where *ni* is associated with subject agreement markers for second and third person

singular (animate).

(3)

- a. ìyòó (n) -ù -lé -sómà kitàpù
 you -foc -sm-2sg -pst -read book
 "You read a book".
- b. Òhányí (n) -ã -lé -sómà kitàpù
 you -foc -sm-3sg -pst -read book
 "John read a book".

Dalgish makes no mention of this optional appearance of the *pv-ni* when associated with the prefixes denoting the second and third person singular (animate). As will be shown shortly, the alternation possibilities borne out in examples (2) and (3) are crucial in the analysis of the distributional patterns of this morpheme in Kivunjo.

3. The distribution of *ni*

As I mentioned earlier, the position of *ni* in a clause can be associated with the *focus marking* of an element in that clause. There are two possible ways in which the association of *ni* with focus marking can be discussed: subject and non-subject focusing marking. In general, Kivunjo favours subject focusing over non-subject focusing while non-subject focus marking is reserved for special discourse situations. When a non-subject is focus marked, a special reading indicates the speaker's intention to provide a focus of contrast between the focal element and another in previous discourse. When a subject is the focal element, both marked and unmarked readings are possible, but this depends on the position the focus marker occupies in the clause. In this section I will discuss both subject and non-subject focusing, starting with subject focusing.

3.1. Subject focusing

A subject may be focused in two ways. The first is by placing the focus marker *ni* before the NP whose grammatical relation is "subject". The second is by attaching the focus marker to the verb that bears a grammatical relation to the subject. In the latter case, the subject NP is optional while the subject marker (*sm*), which is its anaphor, obligatorily appears on the verb immediately following the focus marker. This pattern is what Dalgish (1978, 1979) refers to as *pv-ni*. When the focus marker precedes the NP, we get a contrastive reading in which the NP (here the subject) is the contrasted element. When the focus marker appears as *pv-ni* we get a focus of assertion reading. The following examples are instructive.

(4)

- a. (Nì) m̄fó- í- lé- ráà.
 (foc)- river- sm-cl4- pst- smell bad
 "The rivers (not something else) smelled bad."

b. (Nì) ùngányí ú- lé- m- kòóyá káchà.
 (foc) bigness -sm-cl14- pst- om- find time before
 "Power (not status) found its way to him a long time ago."

c. (N) ìnsódó á -lé -sómà kítápú?
 (foc)- you- -sm-3sg -pst -read book
 "Did the man read a book?"

(5)

a. Mfó (n)- ì- lé- ráà.
 river- foc- sm-cl4- pst- smell bad
 "The rivers smelled bad."

b. Ùngányí n- ù- lé- m- kòóyá káchà.
 bigness -foc- sm-cl14- pst- om- find time before
 "Power found its way to him a long time ago."

c. M̀sónódó n -ä -lé -sómà kítápú?
 man- foc- -sm-3sg -pst -read book
 "Did the man read a book?"

In (4)a-c, we have a case in which the focus marker precedes the subject-NP to mark it as the focal element and to provide a contrastive reading of the subject. In (5)a-c the focus marker appears as *pu-ni* before the verb. The subject is still the focused element except that in this case it does not have a contrastive focus reading. Instead the proposition has a focus of assertion reading.

Now compare the tone assignment in the two sets of examples. In (4)a-c, the subject NPs have an initial (first syllable) high tone (henceforth H-tone). In (5)a-c, the subject-NPs have an initial low tone (henceforth L-tone). To explain this alternation, it is necessary to posit an abstract S-initial L-tone. This L-tone will spread onto any element on S-initial position (Inkelas 1986, McHugh 1985a)⁶. In addition *ni* is underlyingly H-tone and will spread its H-tone to the first syllable of the word in juxataposition⁷. The L-tone on *ni* has its source from the posited abstract S-initial (also boundary) L-tone. This alternation is further illustrated in example (6) below.

(6)

a. n- ù- lé- ráà.
 foc- sm-2sg- pst- smell bad
 "(The river) It smelled bad."

b. *ù- lé- ráà.
 sm-2sg- pst- smell bad
 "It smelled bad."

(6)a but not (6)b is acceptable because of the requirement that *ni* should appear in this construction, not only to indicate the focal element but also to block the spreading of the floating L-tone onto the focal element, the subject marker which refers to the deleted subject-NP.

The claim that the presence and absence of *ni* corresponds to the alternation between H-tone and L-tone is demonstrated by example (7)a and (7)b below.

- (7)
- a. (ni) mfo ũ- lé- ráà.
 L H
 "The river smelled bad."
- b. mfo n- u- lé- ráà.
 L H
 "The river smelled bad."

While (7)a correlates to the tone shift pattern in (4)a-c and (6)a, (7)b exhibits the pattern in (5)a-c and (6)b.

By considering *ni* to be the source for the H-tone on focal elements and by using tone shift to explain the appearance of this H-tone on the focal element, I am also claiming that phrase initial position is a focus position. The claim is supported by an observation made by Harries (1940:134) about Mawia (a Bantu language spoken in Tanzania and Mozambique) that nouns of class 5 drop their prefix *i* and raise the tone on the second syllable. He then suggests that the H-tone must be originating from a floating high, which supports the hypothesis of an optional S-initial *ni* in the case of Kivunjo as shown in (4)a-c and (6)a.

The relationship between *ni*, the H-tone, and the S-initial position is that they all have a focus function. While *ni* may appear optionally, the H-tone is obligatory. Further, *ni* is optional at S-initial position except where there is a subject-NP deletion which conditions the appearance of *pv-ni*. In other words, *ni* cannot be replaced by just the H-tone if the subject-NP has been deleted in that sentence structures.

Additional support for S-initial position *ni* comes from the fact that citations always show an initial H-tone. Example (8) shows a case of nouns in citation forms⁸.

- (8)
- a. *mfo
 river
 "A river/It is a river."
- b. (Nì) mfo
 foc. river
 "A river/It is a river."

Notice that (8)a is unacceptable because of the L-tone, which is disallowed in citations. The grammar has a rule that requires each string to have at least one element in focus. Thus, citations that involve single items have to carry a H-tone on that single item irrespective of whether the focus marker is segmentally present or not.

There is also further evidence for the alternation between focus of assertion and contrastive focus. Because tone is lexicalized, the syntactic tonal profiles depend on options concerning the function of tone and its alternation with the focus marker *ni*. Speakers use H-tone for emphasis, to provide contrastive reading, and in asserting a strong point of view (cf. Clements 1984a:318 for similar views on the relationship between *ne* and tone in Kikuyu). For example:

- (9)
- a. (Nì) kítàpũ kichà.
 (foc) book good
 "A good book."
 - b. Kítàpũ (nì) kichà.
 book (foc.) good
 "The book *is* good."

A speaker will say (9)a when he wants to merely assert something about a particular book which is also known by the hearer. This will be appropriate in a situation where the speaker wants to offer a recommendation. On the other hand, a speaker will say (9)b when he wants to contrast the book with something else which is known by both the speaker and the hearer. Notice that (9)a is possible with or without *ni* in place segmentally because the intended reading can be achieved through tone.

To summarize, I have tried to show that *ni* may be used to mark the subject as the focal element in a clause. It usually appears prefixed onto the verb immediately before the subject marker in constructions where the subject-NP is not overtly expressed. Otherwise *ni* will appear optionally as an unbound morpheme before a subject-NP, and it will assume a S-initial position. Its absence may be compensated for by a floating H-tone on the initial syllable of the subject-NP. This option is very much utilized in fast speech and unmarked propositions. The appearance of the H-tone on the NP can be explained by a tone shift phenomenon which is common in many Bantu languages. The H-tone compensation is not a possible alternative for *pv-ni*.

Because *ni* can be replaced by a H-tone on the first syllable of the subject-NP, its absence does not seem to affect the coherence of the construction. However, when extra emphasis is required, this focus marker is generally required.

It was noted that *ni* will appear before the subject-NP instead of its pre-verbal position when a contrast of focus is intended. Thus what was identified as *pv-ni* by Dalgish (1978, 1979) is in fact a case of a neutral reading of the proposition.

3.2.0. Non-subject focusing by clefting

Clefting is used here to mean the preposing or postposing of an element. An element may be preposed to ensure that the hearer gives it maximum attention. The data used for this study showed the preposed materials to be old information and definite. In this section I will discuss the distribution of *ni* in relation to preposed objects, and adverbs. I will also examine the behaviour of *ni* in re-ordered clauses where one clause is subordinated or embedded in another.

3.2.1. Clefting the object

Kichaga is an SVO language. Thus the normal position for the object is after its verb. I noted earlier that the subject is inherently the focus of a proposition by virtue of its S-initial position in a clause and that this position is a preferred focus position. Consequently, if an element other than the subject is the focus of a proposition, it has to occupy the S-initial position. Examples show that when an object of a verb is clefted, *ni* or a floating H-tone is obligatorily present. The following examples show a case of clefted objects.

(10)

- a. (Nì) máná Óhányí á- lé- m̄ -kápā
 (foc) obj-child su-John sm-3sg- pst -om-3sg -beat
 "It is the child (that) John beat (him)."
- b. *m̄aná Óhányí ä -lé -m̄ -kápā
 obj-child su-John sm-3sg- pst- om-3sg -beat
 "It is the child (that) John beat (him)."
- c. *(Nì) máná Óhányí n- ä- lé- m̄- kápā
 (foc) obj-child su-John foc- sm-3sg- pst- om-3sg -beat
 "It is the child (that) John beat (him)."

(10)a is acceptable because the focus marker has been appropriately placed before the clefted NP *mana* which is also the object of the main verb. (10)b is unacceptable because neither the focus marker nor the H-tone has been used. (10)c is also bad because more than one element in the same clause is focus marked. The focus marker appears at S-initial position as well as *pv-ni*

3.2.2. Pseudo-clefts.

It appears that a pseudo-cleft in Kichaga is simply a sentence whose subject-NP is a free relative clause without a main verb. In such a construction, *ni* appears to resemble the copula in other languages. Although Dalgish (1978, 1979) argues for a *ni* in Kivunjo which may be designated the copula and which is distinct from what he refers to as the *pv-ni*, this study did not find *ni* in Kivunjo to have a strong resemblance to the copula in other languages. Thus, despite translation equivalence the Kivunjo *ni* does not fit the

description of a copula. There are unique differences between this *ni* and the copula in other languages in particular English. In general, this *ni* is optional even where it translates to a copula in equational sentences. Further it assimilates to a nasal where the environment is appropriate, it becomes a syllabic η before vowels, and it may appear as a tonal clitic (H-tone) on the first syllable of the tone bearing unit. The following examples are instructive.

(11)

- a. Òhányí nì m̀súngù.
John foc european
"John is a European."
- b. Òhányí η -ängányì.
John foc- big.
"John is big."
- c. Òhányí (-) m̀súngù.
John (-) european
"John is a European."

In (11)a we have a typical case in which *ni* may be construed as the copula. The same case expressed in (11)b shows that the same *ni* may appear as syllabic η which is conditioned by the vowel. (11)c which may be used to show the optional appearance of *ni* as well as an instance of total assimilation, is yet another proof that this *ni* shares the same characteristics afforded the focus marker *ni*. It is possible also to associate the function of "focus of assertion" to this *ni* since it indicates the speaker's point of view.

It is obvious, therefore, that translation equivalence is not a necessary nor a sufficient criteria for the consideration of *ni* in Kivunjo to be similar to what may be designated the copula across languages.

Now consider the examples of *ni* in pseudo-clefts.

(12)

- a. Kìndò Òhányí á- lé- údlá (η) kítè.
thing John sm-3sg- pst-buy (foc) dog
"What John bought is a dog."
- b. *(Nì) k̀ndó Óhányí á- lé- údlá (η) kítè.
foc thing John sm-3sg- pst-buy (foc) dog
"What John bought is a dog."
- c. *K̀ndó Óhányí n -ä- lé- údlá (η) kítè.
thing John foc -sm-3sg- pst-buy (foc) dog
"What John bought is a dog."

- d. *Kíndó Óhányí n -ǎ- lé- údlá kítè.
 thing John foc -sm-3sg-pst-buy dog
 "What John bought is a dog."

The use of *ni* in (12)a is very much similar to that of the equational sentences in (11)a. Notice that both (12)b and (12)c are unacceptable because of the multiple appearance of *ni*. In addition pseudo-clefts require that the distribution of *ni* be compatible with the tonal patterns of the construction. (12)d is unacceptable because of the absence of the necessary focus markers. Thus, although *ni* is segmentally optional in pseudo-clefts, its optionality has to be compensated by a H-tone on the initial syllable of the pseudo-clefted material.

The appearance of the focus marker is a necessary indication that the clefted material with which it occurs is the focal element. Thus *kite* 'dog' in (12)a-d represent the focal element with a contrastive focus reading.

On the basis of these facts, I consider the focus marker *ni* and the *ni* found in clefts and in equational sentences to be the same. It does not seem necessary to posit two types of *ni* with the same syntactic and functional characteristics.

3.2.3.0. Wh-questions

A wh-question involves the same presuppositional structure as stress-focus, cleft, or pseudo-cleft. Thus a questioned element is necessarily a focal element because the performative function of the wh-word is to request new information. The performative function of focus is to supply or state new or additional information. In Kivunjo, an element can be questioned in two ways: first, by placing the wh-word in situ, and second, by preposing or postposing the wh-word. The wh-word may be preposed when questioning elements other than the subject. The wh-word may be postposed when questioning the subject.

3.2.3.1 Questioning the subject

When the subject is the element being questioned, the focus marker is required whether the wh-word is in situ or elsewhere. Consider the following examples.

- (13)
- a. (nì) wí ǎ- lé- sómà kítàpù?
 (foc) wh- sm-3sg- pst- read book
 "(it is) who read the book?"
- b. à- lé- sómà kítàpú nì wí?
 sm-3sg- pst- read book foc wh-
 "(it is) who read the book?"

- c. *(n)- ä- lé- sómà kítàpú wí?
 (foc) -sm-3sg- pst- read book wh-
 "(it is) who read the book?"

(13)a and (13)b are acceptable but (13)c is unacceptable with or without the focus marker in S-initial position. This can be explained by the fact that the preferred position for the wh-word when questioning the subject is in situ (i.e. S-initial) position. Otherwise the questioned subject will be out of focus. This explains the fact that the focus marker is required when the wh-word for the subject is not in situ. This data is comparable to Kikuyu (cf. Clements 1984b:38) as the following examples show.

- (14)
- a. nó ò- tèm- ír- é mètè?
 foc-wh- sm- cut- pres- fv tree
 "Who cut the tree?"
- b. *ò- tèm- ír- é mètè nó?⁹
 sm- cut- pres fv- tree foc-wh
 "Who cut the tree?"
- c. ò- tèm- ír- é mètè ó?
 sm- cut- pres- fv tree foc-wh
 "Who cut the tree?"

Notice that (14)b is unacceptable although its equivalent in Kivunjo, (13)c, is acceptable. On the other hand, (14)c is also acceptable although its counterpart (13)b in Kivunjo is unacceptable. This provides an interesting comparison. It seems that in Kikuyu the focus marker is generally not required when questioning the subject, but it cannot appear if the wh-word is a pseudo-cleft as in (14)b. In Kivunjo, however, the focus marker or its equivalent must appear whether the wh-word is in situ or is a pseudo-cleft. It seems that in Kikuyu, questions have an intrinsic focus and will have the focus marker *ne* only at S-initial position because that position is used for contrastive focus. In Kivunjo, on the other hand, questions do not have intrinsic focus and will require the focus marker to provide assertive focus. Thus the S-initial position plus the focus marker is used to provide contrastive focus.

3.2.3.2. Questioning the object

Questioning the object differs from questioning the subject by the fact that the focus marker may not appear when the wh-word is in situ and must appear when the wh-word is clefted. Consider these examples.

- (15)
- a. *u- le- soma (ni) kiki?
sm-2sg- pst- read (foc) wh-
“(It is) what did you read?”
- b. (n)- ü- lé- sómà kíkí?
foc- sm-2sg- pst- read wh-
“(It is) what did you read?”
- c. (nì) kíkí u- l'e- sómà?
(foc) wh- sm-2sg- pst read
“(It is) what did you read?”
- d. *kiki n- u- le- soma?
wh- foc- sm-2sg- pst read
“(It is) what did you read?”

(15)a is unacceptable because the focus marker appears with the Q-word in situ. (15)d is also unacceptable because the wh-word has been clefted but neither the focus marker nor its equivalent are present.

This requirement for the focus marker to be present implies that information-seeking questions for subjects will always have a focus of assertion marking. Other questioned elements can only be focus marked for a contrastive reading.

3.2.3.3. Yes/No questions

It has been argued (cf. Dalgish 1978, 1979) that the presence or absence of the *pv-ni* in questions is determined by the type of response expected from the question. The main claim is that the presence of *ni* solicits a positive response, while its absence solicits a negative response. Thus a positive response would be expected from (16)a below, while a negative response would be expected from (16)b.

- (16)
- a. Òhànyí ä- lé- kápá kítè à- lé- ònà?
John sm-3sg- pst- beat dog sm-3sg pst see
“Did John hit the dog that he saw?”
- b. Òhànyí n- ä- lé- kápá kítè à- lé- ónà?
John foc. -sm-3sg- pst- beat dog sm-3sg pst see
“Did John hit the dog that he saw?”

However, when speakers of the same dialect investigated by Dalgish were asked in a separate study (conducted by the author of this paper) to interpret (16)a and b,

the distinction was not between affirmative and negative responses. In fact either of the two can solicit a yes/no response. Speakers revealed that (16)a would be used when initiating a conversation, while (16)b would be used only in the middle of an ongoing conversation. Furthermore, in (16)a, the respondent is expected to posit new information while in (16)b, the respondent is expected to confirm information already shared by the speaker. Thus the distinction here is between "asserted new information" and "asserted old information". Consequently *ni* is required in the case of (16)b but not in (16)a. It is plausible to conclude that yes/no questions of type (16)a do not require the focus of assertion because they have an intrinsic focus of assertion. In general, yes/no questions question the assertion and do not necessarily focus on a particular element (cf. Marchese for a similar observation about West-Kru languages). Yes/no questions of the type exemplified by (16)b require the focus marker because they are not intended to question the assertion but rather to focus on a particular element, in this case the subject.

Another interesting feature noted in wh-questions involves the question tags *wai* and *mcho*. Consider the following examples.

(17)

- a. Òhànyí n -ä -lé -kápá màná wáì?
 John foc. -sm-3sg -pst -beat child tag
 "John beat the child, didn't he?"
- b. *Ohanyi a -le -kapa mana wai?
 John -sm-3sg -pst -beat child tag
 "John beat the child, didn't he?"
- c. Ndèsàmbùdló á -lé -ízá nà nùmbà pfo èè?
 NdesambuDo sm-3sg -pst -pass into house neg tag
 "NdesambuDo didn't enter the house, did he?"
- d. *Ndesambudlo n- a -le -izra na numba pfo ee?
 NdesambuDo foc- sm-3sg -pst -pass into house neg tag
 "NdesambuDo didn't enter the house, did he?"
- e. Màná n -ä -éndá ríchò?
 child foc. -sm-3sg -go tag
 "The child has gone, hasn't he?"
- f. *Màná -á -éndá ríchò?
 child -sm-3sg -go tag
 "The child has gone, hasn't he?"

By using the focus marker in (17)a, the speaker is making an assertion as he/she attempts to solicit a confirmation or denial from the respondent. The absence of the focus marker in (17)b defeats the speaker's purpose, which explains its unacceptability.

In (17)c, the speaker is trying to justify what he/she presupposes. There is no evidence that the speaker has any expectations with respect to the respondent's contribution to his assertion. Instead the speaker expects the hearer to confirm that the action indeed did take place. Thus (17)d is unacceptable because the focus marker allows the proposition to have a focus of assertion which is not compatible with the speaker's uncertainty which is signalled by *pfo*. The evidence required in (17)c is in (17)e in which *mcho* is used and which implies that the speaker does not expect his proposition to be challenged. Thus (17)f is unacceptable because it lacks the focus of assertion which will provide the necessary condition for *mcho* to indicate that the proposition is unchallengeable.

Thus the tags *wai*, *pfo-ee* and *mcho* reflect the speaker's attitude more than what he anticipates of the respondent. This in turn reflects on the distribution of the focus marker in such constructions.

There is an additional fact about the use of these tags which bears on the distribution of the focus marker. The adnominals *wai* and *mcho* will be used where the speaker does not expect that the hearer will challenge the proposition. Contrary to Dalgish (1979:50), the adnominals themselves do not carry a presuppositional interpretation nor show the ability to control the type of response that will be provided by the respondent.

To conclude this section, it is clear that in questioning the subject or the object, the focus marker is preferred. However, there are different consequences for the subject and for the object. The focus marker optionally appears when the *wh*-word for a questioned subject remains in situ and is otherwise obligatory. On the other hand, the focus marker is optional when the *wh*-word for the object is preposed and obligatory when it remains in situ. This is expected considering the distribution of *ni* in clefts. Thus these two observations confirm the hypothesis that S-initial position is a focus position.

3.2.4.0. *Ni* and clause types

Other restrictions on the distribution of *ni* depend on the type of clause. In this section I will discuss the distribution of *ni* in adverbial, independent, and subordinate clauses.

3.2.4.1. Adverbial clauses

Generally, adverbs appear in S-final position, which is not a focused position. When they do appear at S-initial position, which is a focused position, the focus marker or its equivalent is attached. Thus, adverbs behave like objects with respect to focusing.

As the following examples (17)a-c below show, the focus marker and the adverb constitute an adverbial clause which is independent of the main clause. As such, both the adverbial clause and the main clause can have independent focus markers allowing multiple focus markers in one sentence structure. As will be shown later, multiple focus markers are allowed in some sentence structures if the clauses of that sentence are semantically independent.

(18)

- a. Nì wásí n -ü -lé -wóná mndú chò.
foc. clear foc. -sm-2sg -pst -see person that
"Clearly (it is clear) you saw that person."
- b. *Ni wási -u -le -wona mndu cho.
foc. clear -sm-2sg -pst -see person that
"Clearly (it is clear) you saw that person."
- c. *wasi n -u -le -wona mndu cho.
clear foc. -sm-2sg -pst -see person that
"Clearly (it is clear) you saw that person."

The unacceptability of (18)b is a result of the absence of the focus marker in the main clause. The scope of *ni* is therefore limited to the clause in which it occurs. Likewise, (18)c is unacceptable since it is required that the adverb *wasi* form an adverbial clause by combining with *ni* in order to appear semantically independent of the main clause. Further, because *wasi* is occupying sentence initial and there is no other potential subject-NP which precedes the verb, the absence of *ni* will make the adverb appear as if it were the subject of the main verb. However, its association with the verb is blocked by the agreement marker on the verb which distinguishes *wasi* from the real subject of the verb.

The *ni* co-occurring with the adverb has a distinct function from that in the main clause in (18)a. The *ni* co-occurring with the adverb *wasi* provides contrastive focus on the adverb *wasi* while the *pv-ni* attached to the main verb provides assertive focus on the subject of that verb. To a certain degree, this strategy reflects the speaker's attitude with respect to the truth of his assertion (cf. also Dalgish 1979). The speaker does not expect his/her assertion to be challenged. In addition, the presence of the *ni* in the adverbial clause highlights the interpretation 'certainty' which is part of the intrinsic nature of the adverb. Examples (19)a and (19)b below further illustrate this point.

(19)

- a. Nì kúpfá n- ü -lé- íwá màdùwú
foc because foc -sm-2sg -pst -steal bananas these
ghá ö -chí -kápò.
sm-2sg -fut -beaten
"Because you stole these bananas you will be beaten."
- b. *Kupfa n -u -le -iwa maduwa gha
because foc. -sm-2sg -pst -steal bananas these
o -chi -kapo.
sm-2sg -fut -beaten
"Because you stole these bananas you will be beaten."

(19)a shows the focus marker in both the adverbial clause and the main clause. (19)b is unacceptable on the same grounds as (18)c by the fact that the adverb *kupfa* appears as the subject of the main verb but that association is blocked by the agreement marker on the verb. To prevent the adverb from appearing as if it were the subject of the verb immediately following it, the *ni* has to appear to provide the adverb with its own focus structure as in (19)a. There are semantic consequences too. In the absence of the focus marker, the adverb *kupfa* loses its contrastive focus reading and assumes a 'condition/consequence' reading, as (20) shows.

(20)

- a. *Kùpfā -ü -lé -íwá màdùwù ghá*
 because -sm-2sg -pst -steal bananas these
n- ǒ -chí -kápò.
 foc.- sm-2sg -fut -beaten
 "If you stole these bananas you will be beaten."
- b. **Kupfa n -u -le -iwa maduwu gha*
 because foc -sm-2sg -pst -steal bananas these
o -chi -kapo.
 sm-2sg -fut -beaten
 "If you stole these bananas you will be beaten."

Notice that the absence of the focus marker reduces the adverbial clause to a mere adverb whose interpretation depends on the clause to which it is attached. This has some consequences with respect to the distribution of the focus marker in the remaining clauses since conditional clauses cannot have a focus marker, which explains the acceptability of (20)a and the unacceptable (20)b. This will be discussed further in the next section in which I will look at distributional patterns of the focus marker in sentence structures of more than one clause.

3.2.4.2. Coordinate clauses

We have just seen that if a clause does not depend on another clause for its semantic interpretation, it will require its own focus structure. This is clearly exemplified by coordinated clauses as shown in the following examples.

(21)

- a. *Kitè ò-kí -lé -káp -ò*
 dog foc-sm -pst -beat -pass.
ná máná n -ǎ -lé -kí -wónà
 and child foc -sm -pst -it -see
 "The dog was beaten and the child saw it."

- b. *Kite ki -le -kap-o
 dog sm -pst -beat -pass.
 na mana n -a -le -ki -wona
 and child foc -sm -pst -it -see
 "The dog was beaten and the child saw it."
- c. *Kite n -ki -le -kap -o
 dog foc -sm -pst -beat -pass.
 na mana a -le -ki -wona
 and child sm -pst -it -see
 "The dog was beaten and the child saw it."
- d. Kitè ò -kí -lé -káp -ò
 dog foc -sm -pst -beat -pass.
 nà màná á -lé -kí -wónà
 and child sm -pst -it -see
 "The dog was beaten by the child who saw it."

The unacceptability of (21)b and (21)c follows from the fact that the clause without the focus marker is forced to derive its semantic interpretation from the clause with the focus marker. However such a derivation is blocked by the syntactic and semantic structure of the sentence. The clauses are coordinated and are to be interpreted independently of each other. (21)d is acceptable only if the subject of the lower clause (i.e. *mana*) is interpreted as the agent of the passive verb of the upper clause. With a relative clause reading, the lower clause will be interpreted as a complement clause rather than an independent clause.

3.2.4.3. Subordinate clauses

Subordinate clauses include relative clauses and sequential clauses. Characteristically subordinate clauses contain background materials while the main clause provides the asserted materials. Sequential clauses are different in this respect because they do not necessarily contain background information. Sequential clauses are used for the most part to advance the mainline events of a narration. The following examples are intended to show the distribution of *ni* subordinate clauses.

- (22)
- a. M̀sòdò á -íchá n -á -lé -kóDá kelyà.
 man sm-3sg -come foc -sm-3sg -pst -cook food
 "The man who is coming cooked the food."
- b. *Msodo n -a -icha n -a -le -koDa kelya.
 man foc -sm-3sg -come foc -sm-3sg -pst -cook food
 "The man who is coming cooked the food."

- c. Kùpfā á -lé -chá úkóbú
 cond. sm-3sg -pst -come yesterday
 n -á -wé -káà ná -sò.
 foc -sm-3sg -perf -stay and -us
 "If he had come yesterday, he would have stayed with us."
- d. *Kupfa n -a -le -cha nkou
 cond. foc -sm-3sg -pst -come yesterday
 n -a -we -kaa na -so.
 foc -sm-3sg -perf -stay and -us
 "If he had come yesterday, he would have stayed with us."
- e. Máná n- ä- lé- chá, k- á- kòDá
 child foc.- sm- pst- come, -seq.- sm-3sg- cook
 k- á- lyá, (k- á- éndá kányì
 seq.- sm-3sg- eat, seq.- sm-3sg- go home
 "The child came, (then) he cooked, (then) he ate, (then) he went home."
- f. *Mana n- a- le- cha, (n)-k- a- koDa
 child foc.- sm-3sg- pst- come, (foc)-seq.- sm-3sg- cook
 (n)-k- a- lya, (n)-k- a- enda kanyi
 (foc)-seq.- sm-3sg- eat, (foc)-seq.- sm-3sg- go home
 "The child came, (then) he cooked, (then) he ate, (then) he went home."

Examples (22)a and (22)b involve modifying clauses (similar to relative clauses)¹⁰, (22)c and (22)d involve adverbial or condition clauses while (22)e and (22)f involve clauses expressing events in a sequence. Conditional clauses were briefly discussed earlier in my discussion of adverbial clauses.

The unacceptability of (22)b, (22)d and (22)e indicate that *ni* may not appear in embedded or subordinate clauses. There is a discourse restriction which shows that the information contained in subordinate clauses cannot be assertive because subordinate clauses like those described in this paper provide background information. Although sequential clauses do not contain background information, but rather signal mainline events in narratives, they do not allow the appearance of *ni* because they are syntactically and semantically dependent on the main clause. Syntactically they follow the main clause, and they lack subject and tense marking. Semantically, they depend on the main clause for the interpretation of the actor/agent and the time of the action, which is generally presented as past.

The restriction on the distribution of *ni* in subordinate clauses also dictates the order in which the clauses may appear. A subordinate clause of the type discussed in this paper cannot precede the main clause. This is further illustrated below.

(23)

- a. N -ǎ -lé -òná kítè ù -lé -kápà.
foc -sm-3sg -pst -see dog sm-2sg -pst -beat
"He saw the dog (which) you hit."
- b. *a -le -ona kite n -u -le -kapa.
sm-3sg -pst -see dog foc -sm-2sg -pst -beat
"He saw the dog (which) you hit."
- c. N -ü -lé -kápá kítè á -lé -ónà.
foc -sm-2sg -pst -beat dog sm-3sg pst see
"You hit the dog that he saw."
- d. *u -le -kapa kite n -a -le -ona.
sm-2sg -pst -beat dog foc -sm-3sg pst see
"You hit the dog that he saw."
- e. *n -a -le -ona kite n -u -le -kapa.
foc -sm-3sg -pst -see dog foc -sm-2sg -pst -beat
"He saw the dog (which) you hit."

Examples (23)a through (23)e, represent cases in which the focus marker may be associated with asserted information. Not only does the asserted information need to appear in the higher clause but it also needs to be introduced first in the structure of the discourse. Speakers have a choice as to what information to present first, this is reflected in the order in which the clauses are presented as well as the focus structure.

These examples also show that the focus marker *ni* may only appear in the clause that is ordered first. This is demonstrated by (23)b which is the reverse order of (23)a and which shows the focus marker in the lower clause. It is plausible, therefore, to conclude that the clause with the focus marker must always be the higher clause. The clause without the focus marker becomes a dependent clause which disallows the focus marker, as demonstrated by the unacceptability of (23)b and (23)d. The unacceptability of (23)e is prompted by the presence of the focus marker in both the main and subordinate clause.

To summarize, I have shown by examples that *ni* is conditioned by the syntactic position it can occupy in a clause. The preferred position is S-initial position, which is also the preferred focus position. I showed that when adverbs and objects appear in S-final position, they require the presence of the focus marker. While the focus marker may appear in more than one coordinate clause, it may not appear in subordinate clauses of the type described in this paper. I also showed that the order in which clauses appear reflects the speaker's choice of what information to present to the hearer first. This in turn reflects on the distribution of the focus marker in such clauses. It turns out that the focus marker may only appear in the clause which has the information the speaker considers most crucial. Such information is presented to the hearer first.

3.3.0. Other environments without *ni*

Apart from environments discussed in section 3.2.4, *ni* may not occur in negative propositions, nor with the tense markers *am* and *wem*, whose interpretation reflects past time. Negation is generally accomplished by adding the adnominal *pfo* at the end of the proposition. In some marked cases *chi* or *ni* may be used. The following section is devoted to these environments.

3.3.1. The adnominals *pfo*, *chi* and *ni*

Both *pfo* and *chi* are negative morphemes. They differ in that *pfo* and *ni* can appear only in S-final position, while *chi* can appear only in S-initial position.

Consider the following examples.

(24)

- a. Ndésámbúdló á -lé -ókyá nyámá pfo.
Ndesambudlo sm-3sg -pst -roast meat neg.
“Ndesambudlo did not roast meat.”
- b. *Ndesambudlo n -a -le -okya nyama pfo.
Ndesambudlo foc -sm-3sg -pst -roast meat neg.
“Ndesambudlo did not roast meat.”
- c. ú -lé -sómà kítàpú pfo.
sm-2sg -pst -read book neg.
“You did not read a book.”
- d. *n -u -le -soma kitapu pfo.
foc -sm-2sg -pst -read book neg.
“You did not read a book.”

These examples show that *pfo* and the focus marker *ni*—which has been designated the focus marker—are in complementary distribution. (24)b and (24d) are unacceptable, because *pfo* and the focus marker *ni* have been allowed to co-occur.

Now consider these examples with *chi*.

(25)

- a. Chì NdésámbúDó á -lé -ókyá nyámá pfo.
neg. NdesambuDo sm-3sg -pst -roast meat neg.
“It is not NdesambuDo who roasted meat.”
- b. *Chi NdesambuDo n -a -le -okya nyama pfo.
neg. NdesambuDo foc -sm-3sg -pst -roast meat neg.
“It is not NdesambuDo who roasted meat.”

- c. Ch- ũ -lé -sómà kitàpú pfo.
neg. -sm-2sg -pst -read book neg.
"It is not that you read a book."
- d. *Chi n -u -le -soma kitapu pfo.
neg. -foc -sm-2sg -pst -read book neg.
"It is not that you read a book."
- e. *Ch -u -le -soma kitapu.
neg. -sm-2sg -pst -read book.
"It is not that you read a book."
- f. *Chi -n- u -le -soma kitapu.
neg. -foc -sm-2sg -pst -read book.
"It is not that you read a book."

These examples show *chi* at S-initial position co-occurring with *pfo*. No restrictions have been found that prohibit the co-occurrence of both negative markers. However, the presence of *chi* generally requires that of *pfo*, as shown by the unacceptability of (25)e and (25)f. (25)d is unacceptable on account of the co-occurrence of the positive focus marker (occurring as *pv-ni*) and the negative focus marker *chi*.

Although *chi* is somehow dependent on *pfo*, the two have different discourse and semantic functions. It is plausible to consider *chi*, but not *pfo*, to be the negative focus marker¹¹. As a negative marker, *pfo* can be used to negate the entire proposition. The claim that the two adnominals have different semantic functions can be further illustrated by the following examples in which *chi* appears independently of *pfo*. Notice, however, that this is possible only in questions.

(26)

- a. NdésámbúDó á -lé -óky'á nyámà?
(neg) NdesambuDo sm-3sg -pst -roast meat
"NdesambuDo did not roast meat?"
- b. NdésámbúDó á -lé -óky'á nyámá pfo?
NdesambuDo sm-3sg -pst -roast meat neg.
"NdesambuDo did not roast the meat?"
- c. Chì NdésámbúDó -á -lé -óky'ã nyámà?
neg NdesambuDo sm-3sg -pst -roast meat.
"Is it not NdesambuDo who roasted the meat?"
- d. Chì NdésámbúDó -ã -lé -óky'á nyámá pfo?
neg NdesambuDo sm-3sg -pst -roast meat neg.
"It is not NdesambuDo who roasted the meat?"

These examples may be interpreted as follows. (26)a is a simple and neutral “fact finding” question. Although there is no overt negative marker, negation is marked by a floating tone. (26)b is an echo question. The speaker is already aware that the action was not performed. In other words, NdesambuDo was expected to roast the meat. However, it appears that NdesambuDo did not roast the meat. Compared to (26)b, (26)c has a shift in focus. The speaker is aware that the action was performed but is interested in finding out whether NdesambuDo (and not anyone else) roasted the meat. Thus it is a case of contrastive focus, resulting from the presence of the negative focus marker *chi*. Thus *chi* negates the subject–NdesambuDo– but not the rest of the proposition. (26)d is also an echo question. The speaker is aware that the meat was roasted but that someone other than NdesambuDo roasted it. It differs from (26)c, because it has a contrastive reading that can be associated with the focus marker *chi*, while *pfo* provides a negative interpretation of the entire proposition. The speaker presupposes that NdesambuDo did not roast the meat. Further, he is not sure if the meat was roasted at all. Therefore, the co-occurrence of *chi* and *pfo* reinforces the negative interpretation of both the actor and the action.

Now consider the following examples with *ni* as a negative marker.

- (27)
- a. Máná á- lé- ókyá nyámá ñì
child sm-3sg- pst- roast meat neg
“The child did not roast the meat”
 - b. Chì máná á- lé- ókyá nyámá ñì
neg-foc child sm-3sg- pst- roast meat neg
“The child did not roast the meat”
 - c. *Mana a- le- okya nyama ni pfo
child sm- pst- roast meat neg neg
“The child did not roast the meat”

The reading of (27)a is that the child did something other than roast meat. In (27)b the reading is almost a double emphasis (“definitely the child did not roast the meat”). It may be used to indicate that the child roasted something else while someone else roasted the meat. It is, therefore, plausible to consider that *ni* may interact with *chi* in the same way *chi* interacts with *pfo* to reinforce a negatives interpretation of a proposition. On the other hand, *ni* and *pfo* cannot co-occur, as the unacceptability of (27)c shows. This shows that the two are in free variation but are syntactically and semantically in complementary distribution with *chi*. However, it is important to mention that the data shows a wide distribution of *pfo* but not *ni* as a negative marker.

3.3.2. The aspect markers -am- and -wem-¹²

Clauses with the aspect markers *am* and *wem* also seems to affect the distribution of *ni*. The following examples show the distribution of *ni* in clauses with either a tense or aspect marker.

(28)

- a. *Mai n -a -am -okya nyama.
mother foc sm-3sg -im.perf -roast meat
"Mother has roasted the meat."
- b. *Mai n -a -wem -okya nyama.
mother foc sm-3sg -p.perf. -roast meat
"Mother had roasted the meat."
- c. Mái -á -ám -óky'á nyámà.
mother sm-3sg -im.perf -roast meat
"Mother has roasted the meat."
- d. Mái -á -wém -óky'á nyámà.
mother sm-3sg -p.perf. -roast meat
"Mother had roasted the meat."
- e. Mái n -ä -í -óky'á nyámà.
mother foc sm-3sg -pres -roast meat
"Mother is roasting the meat."
- f. Mái n -ä -é -óky'á nyámà.
mother foc sm-3sg -fut -roast meat
"Mother will roast the meat."
- g. Mái n -ä -íchí -óky'á nyámà.
mother foc sm-3sg -fut- -roast meat
"Mother will roast the meat."
- h. Mái n -ä -wé -óky'á nyámà.
mother foc sm-3sg -pst-cont. -roast meat
"Mother was roasting the meat."

Notice that only (28)a and (28)b are unacceptable, due to the co-occurrence of the aspect markers *am* and *wem* with *ni*, a restriction which does not apply to other tense or aspect markers (cf. Moshi 1988). In addition, the restriction does not apply to echo questions or where the focus marker does not appear in the same sentence structure as the aspect marker. Such are cases as those described in section 3.2 and which involve non-subject focusing. Additional examples are given below in which (29) exemplify clefted objects and (30) exemplify echo questions.

(29)

- a. (Nì) mǎná máí á -ám -ínw -óky- í- 'á nyámà.
(foc) child mother sm-3sg -perf.- him roast- appl- fv meat
"The child, mother roasted the meat for him."

- b. (Nì) mǎná máí á -wém -m̄w -óky- í- ʔá nyámà.
 (foc) child mother sm-3sg -p-perf- him roast- appl- fv meat
 "The child, mother has already roasted the meat for him."

(30)

- a. Mǎí n -ǎ -ám -ókyʔá nyámà?
 mother foc sm-3sg -perf. -roast meat
 "Has mother roasted the meat?"
- b. Mǎí n -ǎ -wém -ókyʔá nyámà?
 mother foc sm-3sg -p-perf -roast meat
 "Had mother roasted the meat?"

Considering that the focus marker is not in the same constituent as the aspect marker, it is plausible to consider that the perfective aspect marker has a focus of its own which blocks additional focusing by *ni*. Thus cases like (28)a and (28)b are ruled out because an assertion cannot have more than one focus.

The focus marker is required in (30) which involves echo questions because it provides a contrastive focus reading on the predicate. The speaker is already focusing on the assertion instead of on a particular element, and the contrastive focus reading is intended for the theme of the assertion, which in this particular example is *nyama*.

To summarize this section, I have shown that there are several areas in which the appearance of the focus marker *ni* is restricted. These are subordinate clauses, constructions with the negative markers *chi* and *pfo*, and those which involve the perfective aspects *am* and *wem*. I claimed that *ni* cannot appear in subordinate clauses because they typically contain background information. As such, they lack asserted materials which prompt the presence of *ni*. Negatives and the perfective aspects must be analyzed as having an intrinsic focus. This view that negative markers have intrinsic focus has also been expressed about other languages which utilize focus markers (Givón 1979; Marchese 1983).

4. General Remarks.

The paper has emphasized grammatical considerations for the distribution of *ni*. Very little attention was given to pragmatic considerations. Without doubt, speakers have a large amount of choice as to what to focus and when to focus it. However, the restrictions that have been discussed in this paper are evidence that the language uses grammatical control in the distribution of the focus marker.

I have argued that *ni* in Kivunjo should be analyzed as a focus marker. It may be used to mark contrastive focus as well as assertive focus. As an assertive focus marker, *ni* denotes new information. As a contrastive focus marker, it denotes additional information or corrects false information. It is clear also that Kivunjo does not combine assertive focus with contrastive focus.

As an assertive focus marker, *ni* may not appear in subordinate clauses (such as relative clauses) or other embedded clauses. It was shown that the clause with the focus marker is to be interpreted as the clause with the main information. The clause ordering restriction supports this claim as well as the claim that the main information tends to be presented first.

Although Dalgish (1978, 1979) distinguishes what I am calling the focus marker from the morpheme *ni*, referred to as the *copula*, this study did not find significant characteristic differences between them. The two morphemes are phonologically similar and share the same syntactic and semantic properties. Both may optionally appear in the discourse, and may be replaced by a H-tone on the initial syllable of the following word in the same clause. It is plausible, therefore, to claim that the morpheme *ni* in Kivunjo need not be considered the copula even though it may resemble or translate to a copula in other languages.

The question is whether the *ni* that I am designating the focus marker, and which appears in assertions or contrastive focus constructions, is the same as the *ni* which appears at S-final position in negative propositions. Although the two *ni*'s are phonologically similar, they differ syntactically and semantically. The negative marker *ni* may appear at S-final position and alternates with another negative marker *pfo*. The focus marker may appear before a focal element. A focal element may be any element that appears at S-initial position. When the subject of a proposition is the focal element, the focus marker may appear at S-initial position for contrastive focus or as a prefix on the verb for assertive focus.

Despite these syntactic and semantic differences between the two *ni*'s I am inclined to consider the negative marker *ni* to be a semantic allomorph of the focus marker *ni*. As an allomorph, it may only appear at S-final position, but bears weak focus marking effects. With its focus marking effects weakened, *ni* assumes the role of indicating a negative proposition. It may also be used to reinforce an already expressed negative focus. The former will include cases in which it freely alternates with *pfo* while the latter will include cases in which it co-occurs with the negative focus marker *chi*. This consideration implies that Kivunjo has only one positive focus marker (*ni*) and only one negative focus marker (*chi*). Both the positive focus marker and the negative focus marker may only occur where the main focus of the proposition is. This is a phenomenon which is common in other languages that use overt focus markers (Givon 1975, Kunene 1975, for Zulu; Marchese 1983, for West Kru languages; Clements 1984a, 1984b, for Kikuyu).

Notes

- ¹ This paper is a revised version of a paper presented at the African linguistics conference at Indiana University in 1986. I am indebted to all my friends who have read versions of this paper for their valuable comments. I would especially like to thank Sharon Inkelas, Sandra Thompson and Joan Bresnan for their comments. My gratitude to Ladislaus Semali, the Mlay family and Mr. Makundi for sharing their valuable judgements on the data used in the paper. I am also indebted to the anony-

mous reviewer for the valuable comments that made me re-think my earlier analysis. None of the above are responsible for the data or its analysis.

- ² Kivunjo is on the Chaga dialect continuum spoken in Tanzania on the slopes of Mount Kilimanjaro. There are several dialects which can be listed under the parent language Chaga, and these are spoken in villages separated from each other by a ridge and/or a river. Some dialects are mutually intelligible while others are not, a fact that can be explained by geographical and past political isolation. The dialects may be distinguished geographically by dividing them into three major groups:
- (a) Western : Kisiha, Kimachame, and Kikibosho.
 - (b) Central: Kimochi and Kivunjo.
 - (c) Eastern: Kirombo is the cover term for the dialects of the eastern group and which contains five dialects—Kimashati, Kimkuu, Kiseri, Kingaseni, and other non-Vunjo dialects spoken in villages lying between Mwika (Vunjo) and Mashati (Rombo). A non-Vunjo dialect will either be closely related to the central or eastern group of dialects depending on its geographical position on this continuum.
- ³ Marcel van Spaandonck (1973) notes that many eastern Bantu languages have this morpheme, although Guthrie (1971) mentions no more than ten attesting *ni*.
- ⁴ Cf. Marchese (1983:117). The particles include *me*, *we*, and *ne* whose main function is to indicate a focused element. These particles have a tendency to reduce and may become a particle, suffix or appear as a tonal clitic (mid-high).
- ⁵ The 'S' in 'S-initial' implies main clause or sentence, depending on what is most appropriate at that point in the discussion.
- ⁶ Tone shift moves all underlying tones rightward by one syllable (McHugh, 1985a). Thus the phonetic tone on any syllable will depend on the underlying tone of the syllable before it.
- ⁷ Similar observations were made by Nurse and Phillipson (1977) who did a study of tones in Kimochi, a Chaga dialect which is mutually intelligible to Kivunjo. Although Salóne (1980) —who also studied Kimochi— did not find occurrences of *ni* in her informants' speech, her data shows evidence for an underlying phrase-initial H-tone. This suggests a floating H-tone since there is evidence for an abstract phrase-boundary L-tone in Kimochi. The logical explanation for this floating H-tone in Kimochi, seems to be the deleted *ni*. Additional evidence for the theory of a floating H-tone comes from Marcel van Spaandonck (1973) about Shambaa, Tsonga, Horohoro, Manyika, to mention only a few. Similarly Clements (1984a, b) studied Kikuyu and found that *ne*, which is similar to *ni* in Kivunjo and Kimochi, has an underlyingly H-tone which spreads onto the first syllable of the word that immediately follows it.
- ⁸ The same is true for any citation form, but here I choose to exemplify nouns. Many Bantuists (for example Meinhof 1948 and Horton 1949) would have been content to state that (8)b may mean "a river" or "it is a river", which is what is attested here. However, without knowledge of the function of tone, it will be difficult to see how either reading is possible.

- ⁹ *ne* becomes *no* through vowel harmony when it combines with the *wh*-pronoun *o*. Vowel harmony is also very productive in Kivunjo as can be seen in example (19) and (20) in which the second person singular subject marker surfaces as *o*. It is a combination of *u+i* where *u* is the real subject marker and *i* is part of the future tense marker *ichi*.
- ¹⁰ Relative clauses in Kivunjo are not overtly marked by a relative pronoun, in contrast to many other Bantu languages (e.g. Swahili, Kamba, Taita from which Kivunjo borrows extensively). A relative clause is marked segmentally.
- ¹¹ Makundi (personal conversation), a speaker of the same dialect but from Mamba village (the author comes from Kirua Vunjo, three villages to the west of Mamba), points out that in his speech it is possible to use both *chi* and *ni* as in *ni chi NdésámúDó áléókýá nyámá pfò* but not *chi ní NdésámúDó áléókýá nyámá pfò*. This indicates a possibility of double focus for emphasis in the case of the former while the unacceptability of the latter confirms the association of *ni* with S-initial position focus marking. The speaker has two strategies: negating the focused element as well as emphasizing the contrastive reading. The translation will be something like "It is (definitely) not NdesambuDo who roasted the meat."
- ¹² *Wem* is a reduced form of *we* and *am*, the perfective aspect marker. *We* on the other hand, is also a reduced form, a combination of *wa*, an auxiliary verb 'be', and *i*, a tense marker representing the moment-of-speech (cf. Moshi 1988).

Abbreviations.

1. *asp.* → aspect
2. *pst.* → past
3. *pst.cont.* → past continuous
3. *pres.* → present
4. *fut.* → future
5. *im.perf.* → immediate – perfect
6. *p.perf.* → past – perfect
6. *foc.* → focus
7. *fv.* → final vowel
8. *adv.* → adverb
9. *cond.* → condition
10. *su.* → subject
11. *sm.* → subject marker
12. *om.* → object marker
13. *sg.* → singular
14. *pl.* → plural
15. *cl.* → class
16. *neg.* → negative
17. *pass.* → passive

Tones

1. \acute{o} → high
2. \grave{o} → low
3. \check{o} → super – high
4. \hat{o} → high – low
5. \bar{o} → low – high
6. $^1\acute{o}$ → downstep – high

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SOME MORPHOLOGICAL AND PHONOLOGICAL INTERACTIONS IN LAKHOTA

Trudi A. Patterson

Lakhota phonology includes two processes that seem to be controlled by morphological processes but that also appear to have other peculiar aspects. These are ablaut and velar palatalization. This paper will attempt to show that Lexical Phonology will more elegantly account for these processes than past analyses. It will also be shown, however, that certain recently proposed constraints on Lexical Phonology are too strong. In addition, what appears to be iterative application of one of the palatalization rules cannot be accounted for by appealing to cyclic phonology; and though it appears to be a case of assimilation, we do not seem to be able to appeal to feature spreading either.

Lakhota is a dialect of Dakota, an American Indian language in the Siouan family. Both ablaut and velar palatalization are well documented processes in this language. Briefly, under certain apparently morphologically controlled conditions, the velar stops (*k*, *kh*, *k'*) become palato-alveolar affricates (*c*, *ch*, *c'*).¹ Since Lakhota does have this series of affricates phonemically, we appear to have an example of a non-automatic neutralization process. The segments that appear to trigger palatalization are the high front vowel /i/ and an underlying /a/ that has become *e* by the ablaut process, which is itself morphologically conditioned.

Let us first consider what morphology controls these processes. This investigation will focus on the verbal morphology; nouns will play a smaller role. Verbal morphology is very active, involving prefixation, infixation, suffixation, noun incorporation and the annexation of enclitics. Nouns may frequently be derived from verbs. They may also be "compiled" from other pieces (e.g. noun+adverb--example given below VIII C.). Both velar palatalization and ablaut are intimately tied up with all of these processes.

VERBAL MORPHOLOGY

It may be useful to give first a brief outline of the verbal morphology, in order to make the following discussion more intelligible.

Subjective and objective personal pronouns are affixed to verbs. The personal pronouns are as follows (-pi is the plural suffix):

I	Subject			Object	
		Sg.	Pl.	Sg.	Pl.
	1st	wa-	ɥ-	ma-	ɥ-
	2nd	ya-	ya- -pi	ni-	ni- -pi
	3rd	∅	∅ -pi	∅	wicha- -pi

A 'portmanteau' morpheme, *chi-*, is used for first person subject - second person object. The "object" pronouns are used as subject forms in neutral or stative verbs.

Other verbal prefixes include instrumentals, locatives, and a set of category modifying affixes--benefactive, possessive, reciprocal, and reflexive. Among the suffixes and enclitics are the plural, negative, diminutive, conjunctions, and sentence particles.

Verb prefixes and some of the suffixes and enclitics are as follows (they are given in the order they would be placed on the verb, thus instrumental prefixes in II A are closest to the verb, possessive, reflexive, etc in II B next, and so on; the continuative suffix/enclitic would immediately follow the verb, the plural would appear outside that, and so on):

II PREFIXES:

A Instrumentals

1. *ya-* with the mouth
2. *yu-* by handling or manipulating
3. *pa-* by pushing
4. *pu-* pressure (indefinite direction)
5. *ka-* by sudden impact

B Possessive, Reflexive, Reciprocal, Benefactive

ki- *ic'i-* *kichi-* *ki-*

C Personal Pronouns

wa-, *ya-*, *ma-*, *ni-*, *chi-*, *ɥ(k)-*, *wicha-*

D Instrumentals

1. *wa-* with edged instrument
2. *wo-* with pointed instrument
3. *na-* by foot or leg
4. *na-* by some "inner force"

E "In two/in the middle"

khi-

F Locatives

1. *a-* on
2. *o-* in
3. *i-* against, toward, in contact with, by means of

III SUFFIXES/ENCLITICS

1.	Continuative:	-hą
2.	Plural	-pi
3.	Diminutive	-la/-laka
4.	'Regularly'	-s'a
5.	Augmentative	-xca
6.	Future	-kta
7.	'Rather'	-ka
8.	Negative	-šni
9.	Augmentative	-xcı̇
10.	'As though'	-s'e
11.	'Contrary to fact'	-tkha
12.	Declarative	-(y)(w)e (lo/le)
13.	'Evidently'	-lakha
14.	Quotative	-ska
15.	Declarative	-'

Involved in these phonological processes is also a set of stems, called "dependent verbs,"² used in verb compounds including the following (selected here because of their initial velar):

IV	-khiya	'to cause to' (causative)
	-khiya	'to be of the opinion'
	-kųza	'to pretend to'
	-kapi̇	'to be reluctant to'
	-kho	'to predict, prophesy'
	-kinica	'to be hardly able to restrain from'

These combine with another verb to form complex verbs as the following example shows:

V	witko	'to be foolish'
	witko-kųza	'to pretend to be foolish'

AFFECTED VELARS

VI The following examples show the process of palatalization after the underlying high front vowel /i/:

A. Pronoun+verb

- | | | |
|----|-----------|--------------------|
| 1. | khute | 'to shoot' |
| 2. | ma-khute | 'He shoots at me' |
| 3. | ni-chute | 'He shoots at you' |
| 4. | chi-chute | 'I shoot at you' |

B. Locative+verb

- | | | |
|----|----------|---------------------|
| 1. | 'icaʋi | 'to be hindered by' |
| 2. | 'imakaʋi | 'I am hindered by' |

C. Nominalizer+verb

- | | | |
|----|-----------|------------|
| 1. | kah̄ɪta | 'to sweep' |
| 2. | 'icah̄ɪte | 'a broom' |

D. Noun+verb (Object Incorporation)

- | | | |
|----|--------|--------------------|
| 1. | k'a | 'to dig' |
| 2. | mni | 'water' |
| 3. | mnic'a | 'to dig for water' |

E. Possessive/reflexive/reciprocal+verb

- | | | |
|----|--------------|-------------------------|
| 1. | khuwa | 'to chase' |
| 2. | kichuwa | 'to chase one's own' |
| 3. | 'ichichuwa | 'to chase oneself' |
| 4. | kichichuwapi | 'They chase each other' |

This process is phonologically conditioned. The velar will not palatalize if it is followed by another consonant.

- | | | |
|-----|-------|----------------|
| VII | kte | 'to kill' |
| | nikte | 'He kills you' |

Not all velars will undergo palatalization after this

vowel. First, as Boas and Deloria (1941) note, only active transitive verbs with initial velars are subject to this rule. Neutral (stative) verbs do not undergo this rule. Other velars which fail to undergo palatalization appear on noun stems. The following examples show where palatalization fails to apply to velars immediately following the high front vowel /i/.

VIII A. Neutral verbs

- | | | |
|----|----------|----------------|
| 1. | khata | 'to be warm' |
| 2. | ma-khata | 'I am warm' |
| 3. | ni-khata | 'You are warm' |

B. Noun Stems

- | | | |
|----|-----------|--------------------|
| 1. | kha | 'string, sinew' |
| | wi-kha | 'rope' |
| 2. | khų̄ši | 'grandmother' |
| | ni-khų̄ši | 'your grandmother' |

C. Adverbs

- | | | |
|----|-------------|------------------|
| 1. | thi | 'to dwell, live' |
| | kaitep | 'diagonally' |
| | thi-kaitepa | 'lean-to' |

Underlying initial velars are also palatalized after an ablauted vowel, under certain conditions. Ablaut is a morphologically conditioned phonological process which turns certain a's into e. A fairly well-known fact about Dakota is that major category words may not end in consonants. Consonant final nouns and verbs acquire an epenthetic final vowel, a. Historically, it was just these vowels which underwent ablaut when followed by certain suffixes and enclitics and the dependent verb stems. Synchronically, however, some epenthetic vowels have lost this property while some underlying final /a/s have acquired it. Since there is now no way to predict which will suffer ablaut, those stems which do undergo it must be marked.' This ablauted vowel, then, but not underlying /e/, will trigger palatalization of certain following velars. Furthermore, the velars that undergo palatalization after the ablauted a form a disjoint set with the velars that undergo this rule after /i/. The following examples show this.

- IX A. k_i 'the' (DET)
1. sapa 'black'
 - sape c_i 'the black one'
 2. thipi k_i 'the house'
 3. phe k_i 'the sharp one'
- B. k'eyas 'but'
1. kta 'future/potential'
 - 'iyay_i-kte c'eyaš 'he was going to go on,
but...'
(go FUT but)
 2. wich-o-thi-ta gli k'eyaš 'he came back to the
camp, but..'
(people-LOC-live-to
come back but)
 3. mastica-la khute k'eyaš 'he shot the rabbit,
but'(rabbit-DIMshoot
but)
- C. ka 'qualifier'
1. sapa 'black'
 - sape-ca 'kind of black'
 2. ohiti-ka 'rather furious'
 3. phe-ka 'rather sharp'

Past analyses have tried to squeeze these two actions into one rule. But it has been an uneasy fit. First, the former velar palatalization action operates primarily in the prefix morphology, while the latter applies exclusively to the suffixes/enclitics, because it is dependent upon the ablauting vowel. The latter rule is quite regular--it seems to apply to all suffix and enclitic (not stem) velars following all but only the ablauted vowels, not the high front vowel. The former applies to the high front vowel only in certain morphologically constrained environments. The behavior of the dependent verbs is most revealing. If we consider them stems, and not suffixes as they have been called, they behave quite regularly with respect to both velar palatalization rules.

XI Verb Compounds

A.	1.	chapha	'to stab'
	2.	chaphe-khiya	'to cause to stab'
B	1.	cheya	'to weep'
	2.	cheye-kinica	'hardly able to restrain from weeping'
C	1.	'apha	'to strike'
	2.	'aphe-khiya	'to cause to strike'
	3.	'amaphe-chi-chiya	'I make you strike me' ([LOC.-me-strike]-I you-cause)
D	1.	'aphe-kꞑza	'to pretend to strike'
	2.	'aphe-chi-cꞑze'	'I pretend to strike you.' ([LOC.-strike]-I you-pretend)

Notice that the ablauted vowel of the complement verb does not palatalize the velar of the matrix verb but the high front vowel of the personal pronoun does palatalize the velar. The derivations of "I pretend to strike you" 'aphechicꞑze' (XI D 2.) and "to pretend to strike" 'aphekuza (XI D 1.), for example, would proceed as follows:

UR	[a] [pha] [chi] [kꞑza]	[a] [pha] [kꞑza]
A Personal Pro.	[chi kꞑza]	---
Palatalization	[chi cꞑza]	---
B Compounding	[pha chi cꞑza]	[pha kꞑza]
Ablaut	[phe chi cꞑza]	[phe kꞑza]
C Locative	[a phe chi cꞑza]	[a phe kꞑza]
Ablaut ⁴ and Glottal Epen.	['a phe chi cꞑze] 'aphechicꞑze'	['a phe kꞑza] 'aphekꞑza

Recall also that as shown above (VI C.) the Locatives do trigger palatalization of the following velar. Also recall that palatalization is not triggered by a high front vowel on the following velars of the formatives shown in IX. The

latter is exactly the reverse of what we see in the verb compounds above.

It is apparent, therefore, that we have two velar palatalization rules. I will refer to velar palatalization after underlying /i/ as Velar Pal I and palatalization after ablauted a as Velar Pal II.

Now let us consider the impact of our three rules--Velar Pal I, Velar Pal II, and Ablaut--on proposed constraints in Lexical Phonology.

The prefixes given above (II) are affixed to the verb in roughly the order given. Examples were given in III showing the operation of Vel Pal I between some of these prefixes and verb stems. One of the potential candidates for triggering Vel Pal I would seem to be the benefactive prefix, ki-. It, however, does not trigger palatalization. Consider the following examples:

XII A	1.	khuwa	'to chase'
	2.	kikhuwa	'He chased it for him'
B	1.	khute	'to shoot'
	2.	kikhute	'He shot at it for him.'
C	1.	kaʋa	'to make'
	2.	kikaʋa	'He made it for him.'

Since this prefix appears in the same position in the verb complex as the reflexive, reciprocal and possessive--which do trigger Vel Pal I--we need to determine how these are added to the verb stem and how it is that the benefactive fails to trigger Velar Pal I. Notice that however we apply these, we violate some proposed constraint on the phonological rules and levels of Lexical Phonology. Let us consider the following potential ordering:

XIII	Morphology	Phonology
1	Possessive Reflexive Reciprocal	Vel Pal I
2	Benefactive	
3	Personal Pronouns	Vel Pal I

This suggestion, however, violates a constraint that Mohanan (1986) proposes, namely, that phonological rules apply on continuous levels:

XIV "The domain of a rule may not contain nonadjacent strata."

If, on the other hand, we assume the following strata, we violate a proposal made by Kiparsky (1985) that all phonological rules are "on" at the beginning of the cyclic phonological component and are only "turned off" at appropriate times.

XV	Morphology	Phonology
	1 Benefactive	
	2 Possessive, etc.	Vel Pal I
	3 Personal Pronouns	Vel Pal I

It will be seen below that the behavior of phonological rules with respect to the suffixes favors slightly the schema in XV.

Another correct prediction we will be able to derive from this treatment is that Vel Pal I "turns off" before the lower verb is added, consider the following:

XVI A	mani-kapı	'He is reluctant to walk' (walk-be reluctant) (3rd Sg.=0)
	B nıwı-ıhıni-khiya	'He causes his swimming to end' (swim-end-CAUSE)

Notice in these forms that the final *i* of the lower verb fails to trigger palatalization. Using the structure in XV, we can then assume that the complement verb is added to the verbal complex on some level 4, where Vel Pal I is no longer applicable.

Another peculiar aspect of the Benefactive appears to complicate the issue here--it appears to suffer from "Palatalization Creep." That is, IT can become palatalized, and when it does, it will become a palatalizing prefix. Consider the following:

XVII	khuwa	'to chase'
	1. i. kikhuwa	'He chased it for him'
	ii. wakikhuwa	'I chased it for him'
	iii. makikhuwa	'He chased it for me'

2. i. nicichuwa 'He chased it for you'
 ii. chicichuwa 'I chased it for you'

If these prefixes are added according to XV above, we need to explain how the benefactive prefix suddenly acquired the ability to palatalize a following velar. It has been proposed by Carter (1974) that the "benefactive prefix is marked with a rule feature [-velar palatalization trigger] ... and that application of VELAR PALATALIZATION changes the value of this feature." Exactly how a phonological rule is to effect a phonological change as well as a rule feature change is not outlined. But additionally, we would like, in the framework of Lexical Phonology, not to have to appeal to such ad hoc rule features.

If we assume the schema outlined in XV above, we can frame the Vel Pal I "straightforwardly" as follows:

XVIII Velar Palatalization I

$k, kh, k' \longrightarrow c, ch, c' / i \underline{\quad}$

We can then allow Vel Pal I to apply "across the board" and derive the correct forms. The exact nature of this rule is somewhat problematical, however. One of the expectations for the idea of the cycle in phonology was that it would explain iterative application of phonological rules. We do not appear to be able to appeal to the cycle here, though. In the case of nicichuwa (XVII, 2, i. above), we would have the following derivation:

UR		[ni] [ki] [khuwa]
I	Benefactive	[ni] [[ki] [khuwa]]
	Velar Pal I	--
II	Pers Pronoun	[[ni] [[ki] [khuwa]]]
	Velar Pal I	[[ni] [[ci] [khuwa]]]
		*nicikhuwa

There appears to be no way for us to obtain palatalization on the verb stem without iterative application of this rule.

One might suggest that recent proposals involving the internal structure of segments may be of assistance in explaining this action. Without going into great detail here, Sagey (1986) discusses the case of Fanti where alveolars "assimilate in dorsal features to a neighboring vowel." This involves the spreading of the dorsal node in the distinctive feature hierarchy and the delinking of the coronal node. We

seem to have just the reverse case in Lakhota: the coronal node may be said to spread from the high front vowel /i/ in the personal pronoun over the next segments (applying "vacuously" shall we say to the intervening /i/s) until the high back vowel (in this case) is reached. However initially attractive, the appeal to a complex structure in the segment does not get us over the boundary problems reflected in the derivation above.

One might be tempted to propose a post-lexical rule acting "across the board." But a rule of this nature would incorrectly predict that all velars should palatalize after /i/--an obviously undesirable result.

What we are left with appears to be a case of iterative application of the phonological rule Velar Palatalization as in XVIII above on levels 2 and 3 of the suggested schema in XV. Notice, however, that this proposal does not violate the strict cycle condition. Those benefactive forms shown in XII are, on levels 2 and 3, underived forms and will not be subject to the rule. Those forms in XVII 2, however, will have undergone morphological rules on these levels, thus allowing them to be input to the phonological rule of Velar Palatalization I--applied iteratively.

Velar Palatalization II and more importantly Ablaut, in addition to having what is apparently a global relationship, seem to cause other problems for proposed constraints in Lexical Phonology.

Of the suffixes and enclitics (IV above), some of those ending in a, like stems ending in a, undergo ablaut when followed by other suffixes/enclitics. Therefore, not only do they cause ablaut, they may undergo it themselves.

XIX Suffixes/Enclitics and Ablaut

Suffix/Enclitic	Triggers Ablaut	Undergoes Ablaut
1. -hą	-	+
2. -pi	-	N/A
3. -la	-	-
4. -s'a	+	+
5. -xca	+	+
6. -kta	?	+
7. -ka	+	+
8. -šni	+	N/A
9. -xcı	+	N/A
10. -s'e	+	N/A
11. -tkha	-	-
12. -ye/-we	?	N/A
13. -laka	-	+
14. -ska	-	+
15. -'	+	N/A

The future enclitic triggers a special rule. It turns ablauting vowels into $\dot{\imath}$, but itself undergoes "regular" Ablaut,

XX	wąyąka	'to see'
	wąyąk $\dot{\imath}$ kta	'He will see him'

The suffixes and enclitics are added to the verb complex in the order given above. Notice in XX that once again a rule, this time Ablaut, must not apply on the very first stratum--Ablaut is not triggered by the first three suffixes. The following forms show the placement of some of these particles with respect to each other:

XXI	1.	'eye-šni	'He didn't say it'
		'eya-hą-pi	'They were saying'
	2.	hokš $\dot{\imath}$ -pi-la	'The ones who are little boys'
	3.	sapa	'to be black'
		sapeca	'It is rather black'
	4.	t'i-kte-šni	'He is not going to die'
	5.	miyoglas' $\dot{\imath}$ hiyuya-pi s'e	'Like flashes being sent' (mirror-send-pl-as though)
	6.	'owehaha-pi-la s'a	'They make jokes regularly'
	7.	'iyokiphi-šni s'e	'As though he was displeased'
	8.	nayax $\dot{\imath}$ -šni-ye-lakha	'Evidently you have not heard'
	9.	ci-ke-šni	'He is rather disinclined to do it'
	10.	'opha-xc $\dot{\imath}$ -kta	'He really wanted to join'
	11.	thathąka ota opila-xca-ke lo [o+pi+la+xca+ka e] (buffalo many shoot-PL-DIM-AUG-rather DECL)	'They certainly killed many buffalo.'
	12.	chachiphapha kta tkha ye lo (stab (redup)+I-you FUT contrary DECL)	'I could have stabbed you.'
	13.	slolye-šni-xc $\dot{\imath}$	'not knowing verily'
	14.	wichowe-pi-la ye	'They are of common parentage, little ones.'

The suffix/enclitic #12 in XX poses somewhat of a problem. First, this particular affix seems to be simply -e, which acquires a glide when it follows underlyingly vowel final stems. As Boas and Deloria (1941) explain, "The particle ye is attached to stems ending in unchangeable a or ą, or in e, i, i...after ,o, u, y, it takes the form we." Ablauting vowels behave somewhat differently, "with changeable a or ą it is contracted to e." (Boas and Deloria 1941) The interesting question to ask is whether the vowel ablauts and is then collapsed with the following vowel or if the ablauting vowel is simply collapsed without first being ablauted. Shaw (1980) opts for the former explanation:

Specifically, if the final vowel in a stem normally subject to ABLAUT does not, for some reason, undergo the rule, then an epenthetic glide is inserted. This shows, therefore, that it is not just the ablauting "potential" of a given vowel which will trigger a merger with the predicative e; rather, the stem-final a or ą must actually undergo ABLAUT. The type of data which show this are reduplicated vowel-final stems, for although ABLAUT applies to these stems in non-reduplicated form, it never applies to the reduplicated forms....Compare, therefore the following data:

a. /yatka=e lo/ [yatke lo] 'he drank it (male spkr)

/yatka+tką=e lo/ [yatkatkaye lo]

'he drank repeatedly' (male speaker)

(Shaw 1980)

If we opt for this solution, however, what we are saying is that ablaut applies when suffixes/enclitics number 4 through 10 (in XX) are added to the stem, ablaut does not apply when number 11 is added, but then ablaut applies once again when the particle -e is attached. That is, we seem, therefore, to have the following strata:

XXII	Morphology	Phonology
I	-hą -pi -la	
II	-s'a through -s'e	Ablaut
III	-tkha	
IV	-e (le/lo)	Ablaut
V	-lakha	

-ska

This turning rules off and on again is precisely the kind of weakening of the theory that we would hope to avoid. Since the particular forms to which this "ablaut loss" occurs are just those underlyingly vowel final stems which did not originally (diachronically) undergo ablaut, it would not be too surprising to see that these forms lose this feature under certain circumstances. Also, it is not uncommon for reduplicated forms to become "frozen" in particular ways. In addition, this particular vowel seems to "collapse" with another suffix, namely *-pi* (plural), to form *-pe*. So it may be rather more likely that this is a vowel deletion process, whereby the vowels of vowel-final forms subject to ablaut are simply deleted, and we need not appeal to ablaut.

We are left with rather weak arguments in favor of either analysis for the declarative/predicative *-e* and ablaut of the vowel-final stems. The one strong argument in favor of not allowing ablaut to apply here is the fact that we can thereby save the continuous strata constraint (XIV above).

But, we have just one last problem. As Boas and Deloria (1941) explain, "the end of a declarative statement of a commonly known fact...is expressed by the terminal glottal stop...Changeable terminal a becomes e." (suffix/enclitic #15 in III above). Consider the following data:

- XXIV 1. tase nit'api kte ka 'Surely you shall not die'
 2. ye-la-ka 'He is really going along'
 'oxloka-la-ke-' 'That is some hole'

We see here that the last particle added to the verb complex once again triggers ablaut. So while we can add a vowel deletion rule and ablaut to level III in XXIII above to avoid the "turning off and on" of ablaut, we must apparently "turn on" ablaut one last time. It is possible, however, that this may in fact be a rule of the post-lexical (phrasal) phonology. I do not have sufficient data to address this question here.

We have seen that the phonological and morphological processes of Lakota may be described more efficiently by Lexical Phonology and that these processes have relevance for proposed constraints in Lexical Phonology.

NOTES

¹ Lakhota does not make phonemic use of the distinction +/-voice. It does differentiate between plain, aspirated and glottalized voiceless stops--thus the spelling Lakhota, the k is aspirated, the t is plain. I use the notation Ch to indicate aspirated stops and C' to indicate glottalized stops.

² These formatives have been called dependent verbs, incomplete verbs, auxiliaries, or even suffixes in Lakhota sources. As Boas and Deloria (1941:74) note, however, "The position of the pronoun is always as though they were independent verbs, the verb to which they refer being in subordinate form." In more current terminology, these "dependent verbs" would be matrix verbs and the verbs "to which they refer" would be complements. I will break with tradition and use the more current terms.

³ As Shaw (1980) convincingly shows, this involves less marking than other alternatives.

⁴ Ablaut is triggered here by the "declarative particle," discussed further below.

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ON DERIVING SPECIFIERS IN SPANISH: MORPHO-PHONO-SYNTAX INTERACTIONS*

Uthaiwan Wong-opasi

The Spanish masculine singular definite article el exemplifies interactions between morphology, phonology, and syntax. El is claimed to be a converted feminine form found solely in front of a feminine noun beginning with a stressed low vowel [á] (cf. Plank 1984, Zwicky 1985). Its regular appearance, however, is before a masculine singular noun. Phonological rules such as Apocope, Vowel Truncation and Epenthesis must take both morphological and syntactic information into consideration during word formation in deriving the two instances of the definite article el. The proposed analysis is supported also by the derivation of the whole class of Spanish specifiers.

1. Identifying the problem¹:

The variation in forms of Spanish definite articles, e.g. el m. sg., los m. pl., la f. sg., las f. pl., and the whole class of specifiers, has been viewed as highly idiosyncratic, and thus, is considered as needing memorization. An issue which has been taken up recently in the literature is but a narrow aspect of this wide range of alternations, namely, the replacement of la by el before a stressed [á] of a following feminine noun. Plank 1984 proposes disagreement rules while Zwicky 1985 suggests referral rules.² As criticized by Harris 1987, the former position is not justified for this phenomenon because the converted article, i.e. la --> el does not disagree in gender with a following feminine noun beginning with

a stressed vowel. The latter postulation is not tenable, either, since Zwicky's referral rule is not broad enough to cover all the differing manifestations of Spanish definite articles. However, Harris' account, which is tentative in nature, needs a more indepth exploration. Firstly, his allomorphy rule does not explain why it is that only definite articles undergo the change. In fact, we also find similar alternations in other sets of specifiers, i.e. an array of variable determiners: ún - uno - una 'a(n), one', éste - ésto - ésta 'this', and quantifiers: algún - alguno - alguna 'some', primer - primero - primera 'first', etc. Secondly, he left unexplored the overlapping areas of morphology, phonology, and syntax. To this date, in the realm of morphosyntax, no attempt has been given in the literature to explain why the binary masculine vs. feminine contrast in Spanish must be relaxed to allow the third parameter, the neuter gender, e.g. (el)lo, and the like forms, to show up only in determiners. I will also try to improve on Harris' analysis, e.g. that the diacritic [á] can be explained, that definite articles are not themselves pronominals (rather, they are pronominalized via deletion of the head of NP), and that Harris' allomorphy rule cannot distinguish lo bueno 'the good (thing/part)' from el bueno 'the good one' since both articles are masculine pronominals. The objective of this paper is thus to argue for a better, more comprehensive analysis of the phenomenon.

2. Allomorphic variations:

Harris (1987:178-181) postulates an allomorphy rule, responsible for the varying phonological segments selected from the ordered sequence e-l-l-o/a-(s). His rule is reproduced below.

(1)

V --> Ø / [X [...--]c Y] NP (X, Y possibly null)

Condition: (a) C = Pronominal

(b) C = Masculine

According to Harris, the notation of this rule is intended to be neutral over 'syntactic' and 'phonological' interpretations. Interpreted syntactically, (1) specifies the contexts in which el, el, aquél occur, on the assumption that their phonological representations are underived. Interpreted phonologically, (1) specifies the conditions under which a vowel is deleted, on the assumption that it is present in the underlying phonological representation of the items in question. Harris' approach, however, is phonological. Rule (1) must contain the diacritic C to exclude final-vowel deletion to nonpronominals, e.g. primo --> *prim 'cousin, m.', and to feminine forms, e.g. nominals prima --> *prim 'cousin, f.'; nominative pronouns ella --> *el(l); accusative pronouns la --> *l; definite articles la --> *l; and distal deictics aquella --> *aquél(l). The dropping of the initial unstressed syllable of /ellV/ of accusative pronouns, is described as follows:

$$(2) \begin{array}{c} \check{V} \\ \S \ \S \]_{, \text{pron}} \quad (\check{V} = \text{stressless syllable}) \\ \downarrow \\ \emptyset \end{array}$$

To warrant the change from the feminine to the masculine article, i.e. la --> el, Harris includes the specification of Y as = {á..}NON, e.g. *la agua --> el agua.

Finally, the label NP is crucial since it excludes the application of apocope to the accusative masculine clitic (i.e., ello --> lo --> *l). This is due to syntactic distribution of these lexical items. That is, only nominative pronouns can be heads of Noun Phrases, while the articles and accusatives can only be non-heads of Noun Phrases and Verb Phrases, respectively. Evidence can be drawn from similar alternations in deictic forms which occur syntactically in isolation as head of a Noun Phrase (aquél 'that one') and in either pre- or post-nominal position (aquél libro, el libro aquél).

3. In the lexicon

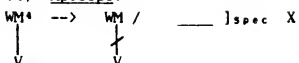
I propose that allomorphic variations of definite articles as exemplified in Harris 1987 be accounted for in a broader perspective, namely, that these changes in forms are systematic as a result of the spelling out of a derivational stem (DS) plus an ending (or Word Marker in Harris' 1985 term), by the so-called "Word Marker Spell" operative in all other types of derived lexical items. This hypothesis is supported on independent grounds by similar variations in all classes of specifiers in Spanish. Data below show the effect of Word Marker Spell. The WM is either the unmarked masculine [o] or a more marked feminine [a]. The [s] is the unmarked plural morpheme.

(3)

UR	m.sg.	f.sg.	m.pl.	f.pl.	gloss
	1. <u>Indefinite articles:</u>				
ún+WM	úno	úna	únos	únas	'a(n), one'
	2. <u>Quantifiers:</u>				
algún+WM	algúno	algúna	algúnos	algúnas	'some'
ningún+WM	ningúno	ningúna	(ningúnos)(ningúnas)		'none'
primér+WM	priméro	priméra	priméros	priméras	'first'
tercér+WM	tercéro	tercéra	tercéros	tercéras	'third'
postrér+WM	postréro	postréra	postréros	postréras	'post'

Of interest here is the fact that the final vowel [o] of the masculine singular form of all the above-listed indefinite articles and quantifiers is apocoped before a masculine singular noun so that algúno --> algún, ningúno --> ningún, etc. Following is my formulation of the apocope rule, which is described as the truncation of the association line linking the vowel slot to the WM in the morphological tier.

(4) Apocope:

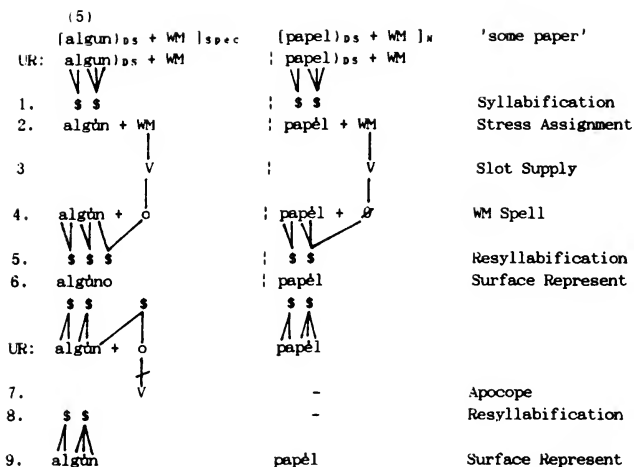


Condition: X = Head N'', masc. sing. and nonnull

The feature masculine singular of the following Head N'' is crucial to exclude the rule from applying to the feminine gender and the plural number. These specifiers must also precede the head of NP since when they follow, no apocope occurs (cf. algún hombre 'some man' vs. hombre alguno 'any man'). It is also mandatory that the specifiers and the Head N'' are sister nodes of the same maximal NP to account for the lack of apocope in the accusative clitics. (For the syntactic analysis, cf. section 4 below.)

The reason why only the masculine singular form undergoes apocope can be explained as follows. Word-final rhyme in Spanish is a weak position where the phonetic segment contained therein may suffer loss, e.g. through apocopation or deletion as found in the s-Aspiration process. Moreover, unlike WMs in nominals which must be specified as [+feminine] to bring out the WM [a], or the more constrained [-low] for vowels other than the masculine [o] and the feminine [a], e.g. [e], [i] or [u], etc. (cf. Harris 1985), WMs of specifiers and adjectival forms systematically end in the contrastive pair, i.e. the overt [o] or zero masculine vs. the more-marked feminine [a] (guapo - guapa, español - española), or share a noncontrastive marker for both genders (grande, cualquiera). Therefore, in closely-knitted units such as Specifier + N, the unmarked masculine singular WM is dropped out.

The following derivation, which is consistent with the cyclic proposal in Wong-opasi (1987a, b), demonstrates the effect of apocope. The cyclic approach also accounts for stress distribution, i.e. the penultimate vs. ultimate stresses in the full vs. apocopated forms, respectively (alguno - algún).



I represent here the derivation of algún(o) and papél, first as separate lexical entries (cf. steps 1-6) and later, as a syntactic unit, i.e. NP, to demonstrate the effect of apocope (cf. steps 7-9). Step 1 is syllabification. Wong-opasi (1987a, b) proposes the rule of stress assignment, "Stress the last syllable of the rightmost derivational stem (DS) unless marked otherwise in the lexicon by Extrametricality." This is partially due to the fact that the final syllable of DS is always heavy, underlyingly. In effect, primary stress is placed on the last syllable of algún and papél before the integration of WM in step 3 where a V slot must be supplied for the attachment of the WM in step 4. Lexical resyllabification readjusts the outputs to include the new morpheme. The surface representation (SR) of the specifier at this point is thus the paroxytone algún^o although its UR carries ultimate stress. When the specifier stands in front of a masculine singular

nominal, apocope applies in step 7 where the association line between the WM and the skeletal plane is cut in the process of apocope so that the WM is not realized phonetically. Lexical resyllabification reapplies in step 8. The surface representation of specifiers after apocope preserves the underlying ultimate stress given that the WM is dropped out. Thus, the surface contrast algúno -algún is explained. Apocope cannot apply to the feminine singular given that the Spec must precede a masculine singular head N'', nor can it affect the plural forms of both genders since the WM no longer stands at the edge of the word.

It can be noted that apocope is restricted to certain words in Spanish. Firstly, only three ordinal numbers and three adjectives: buéno, málo, gránde undergo the final-vowel deletion as a result of their being preposed from the post-NP position to be an adjunct of specifiers. Otherwise, apocope applies to specifiers themselves, e.g. determiners, deictics, and certain quantifiers, among others. That is, selected items within these lexical classes are apocopated in accordance with the Possible Syllable Structure Condition which allows only sonorants, i.e. alveolar nasal [n], and liquids [l, r] in word-final position in Spanish. Thus it rules out apocope in forms which would otherwise end in a nonpermissible coda.

(6) I. Ordinal Numbers:

primero --> primer	'first'	segúndo --> *segúnd	'second'
tercéro --> tercer	'third'	cuárto --> *cuárt	'fourth'
quinto --> *quint	'fifth'	séxto --> *séxt	'sixth'
séptimo --> *séptim	'seventh'	octávo --> *octáy	'eighth'
novéno --> *novén	'ninth'	décimo --> *décim	'tenth'
postréro --> postrér	'last'	último --> *últim	'last'

II. Quantifiers:

algún	--> algún	'some'	ningún	--> ningún	'none'
ciérto	--> *ciért	'certain'	tánto	--> *tánt	'so much/many'

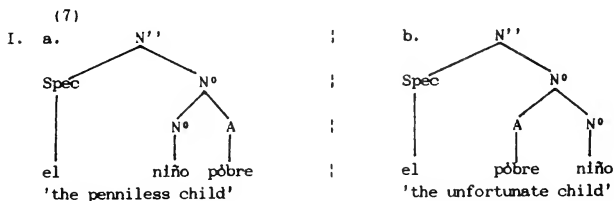
III. Adjectives:

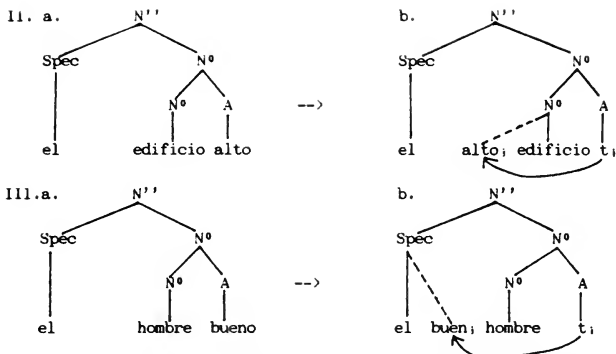
buéno	--> buén	'good'	málo	--> mal	'bad'
-------	----------	--------	------	---------	-------

As seen, the three apocopated ordinal numbers end in [r, l, n]. The

ill-formed *novén is the only exception to the rule.

The fact that ordinal numbers, quantifiers, and a few adjectives manifest apocope when they precede a noun, e.g. buén hómbre 'good man', mal libro 'bad book', but they preserve the full form postnominally, e.g. hómbre buéno 'good man', libro málo 'bad book', may suggest their sensitivity to the pre-NP position. However, this is not generalizable to all prenominal adjectives, e.g. *pór hómbre 'mere man' vs. hómbre púro 'pure man', *póbr niño 'unfortunate child' vs. niño póbre 'penniless child'. One observation can be pointed out here. Adjectives in the latter case create contrastive meaning with respect to their position with the noun they modify while those in the former, apocopating set do not. On the assumption that transformations cannot change meaning, we must claim that contrastive adjectives are generated as separate homophonous lexical entries and each takes its corresponding position in relation to the nominals, i.e. Adj. + N vs. N + Adj., as specified in the lexicon. Nevertheless, contrastive vs. noncontrastive meaning is not a reliable parameter since we also find lack of apocope in noncontrastive preposed adjectives such as edificio áto --> áto edificio 'tall building', árbol bonito --> bonito árbol 'beautiful tree'. I advocate, in contrast, that the difference lies in the fact that adjectives which allow apocope are preposed from the postnominal position and adjoined, not to its sister node N^0 , as in the case of nonapocoped, noncontrastive, preposed adjectives, but to the higher Specifier position. The relevant structures are represented below.





As can be seen, it is the Spec position that triggers apocope. It is predicted, then, that when the movement is not to Spec as in the rest of adjectives (cf. (7.II)) or when the adjectives which allow apocope (cf. 7.III) form a complex adjectival unit with other adjectives, no apocope occurs, e.g. un buen padre 'a good father' but un bueno y cariñoso padre 'a good and loving father' (cf. un *buen y cariñoso padre).

We turn now to the more complicated derivation of Spanish deictics which involve the rule of epenthesis in addition to apocope. Their distribution is as shown below.

(8) Deictics:

m.sg.	neuter sg.	f.sg.	m.pl.	f.pl.	gloss
éste	ésto	ésta	éstos	ésta	'this/these'
ése	éso	ésa	esos	esas	'that/those'
aqué	aqué	aqué	aqué	aqué	'that/those over there'

The above distribution always puzzles language learners since Spanish has only two genders: -- masculine and feminine -- yet we

find the neuter gender only in deictics (ésto, éso, aquéello), definite article (ello, lo), and accusative pronoun (lo). I propose that the answer to this problem lies in the morphosyntax of these items. For the moment, let us focus on the morphophonological aspects of the contrastive masculine singular and neuter forms of deictics.

The underlying representation of all three deictics is ést+WM; és+WM; and aquél+WM, respectively. I postulate that the masculine singular deictics, another class of specifiers, when standing in front of a masculine noun, are subject to apocope. Hence, ésto --> /ést/; éso --> /és/; aquéello --> aquél (the form between two slashes denotes an intermediate stage of derivation). Since /*ést/ cannot surface because of its final consonant cluster, the CV adjustment provides an additional syllable nucleus to break the cluster into heterosyllables, yielding éste. Although cluster simplification cannot be claimed for the derivation of ése from éso, one observation is helpful here. That is, [s] is a highly-marked word-final rhyme in Spanish, found mostly in morpheme markers, i.e. plural ending of nonverb forms and person markers of verbs, and in a handful of lexical items. When encountered with a marked word-final consonantal coda, Spanish provides two alternatives, either dropping the final C or preserving it with the help of epenthesis, as practiced in the nativization of loan words such as beefsteak --> bisté(k), check --> chéke, ticket --> tikéte, and so on. In the case of deictics, epenthesis is chosen in order to preserve information which would otherwise suffer further loss, i.e. ésto --> /ést/ --> /és/ --> *é and éso --> /és/ --> *é. Additionally, there is a palatalization rule of [l] before an overt WM, e.g. aquéello, aquélla, etc. from aquél+WM, and ello, élla from l+WM (cf. (11) below).⁶ The claim that the final [e] of both éste and ése is epenthetic is clearly supported by their plural forms: éstos and esos, respectively (cf. *éstes; *eses).

We will now look at the variation of definite articles, nominative pronouns and accusative clitics. According to Harris 1987, the underlying representation is ellV for all these lexical classes.

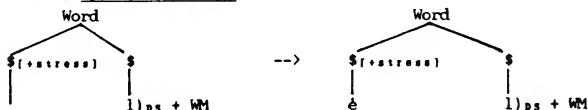
However, I will account also for neuter forms. Harris' proposal is given in (9) while I offer a broader analysis in (11).

(9)					
Noun	Nom	Pron	Acc	Pron	
primo	ella	ello	ella	ello	Underlying Phono. Repres.
		ell			Rule (1)
primo	élla	éll			Stress Assignment
			la	lo	Rule (2)
		él			Depalatalization
primo	élla	él	la	lo	Output

The explanation is straightforward. The final vowel of the masculine nominative pronoun ello is not manifested phonetically due to the effect of rule (1). Harris attributes the non-application of rule (1) to accusative pronouns to syntax. That is, the nominative pronouns can only be heads of Noun Phrases while the articles and accusative clitics can only be non-heads of Noun Phrases and Verb Phrases, respectively. Thus the status of these three sets of forms as clitics or not, hence their ability to be stressed, is predictable (inversely) from their status as heads of syntactic phrases. In effect, stress assignment operates on nouns and nominative pronouns but not on accusative clitics. Subsequently, rule (2) applies to drop the initial stressless syllable of the accusative clitics. The intermediate form /*éll/, however, cannot surface since Spanish bans word-final palatals. Thus, depalatalization follows to render él (cf. *doncéll --> doncé; deadéñ --> desdén).

Harris' observation of the distinction between the nominative and the accusative case for the application and non-application of apocope is valid since these two cases are syntactically different. However, instead of postulating that the apocopated forms must be pronominal, I propose that they are specifiers. Both the nominative pronouns and pronominalized definite articles are specifiers originally but can be pronominalized via deletion of head NP (cf. section 4). Moreover, rule (2) is untenable since there is no

obvious reason why the initial stressless syllable must be dropped. Harris' analysis is not clear, either, how the sequence ellv can be parsed as el-la where the two liquids do not form a palatal. Furthermore, assuming that the palatal consonant is in the UR, Harris' depalatalization only takes care of word-final palatals and not those in word-initial position. Alternatively, I suggest that the UR of this morphosyntactic entity is l+WM. This accounts for the opposing forms lo, lo, la for the neuter, masculine, and feminine gender, in that order. The monosyllabic vs. bisyllabic alternants, e.g. ello vs. lo, is due to the universal requirement that a phonological word must contain a minimal stress unit in languages that have stress contrast (cf. McCarthy and Prince 1986). For Spanish, both the articles and the accusative clitics cannot exist as a separate word phonologically while nominative pronominals can be found in isolation. Therefore, nominative pronominals are required to carry stress. However, the underlying monosyllabic l+WM poses some problems. Since stress is assigned before the manifestation of WM (cf. Wong-opasi 1987a, b), it follows that stress cannot be placed on WM. Thus, the phonetically empty stressed syllable of the nominative pronominals must be filled and the default vocalic nucleus for Spanish is the epenthetic [e]. This process is illustrated in (10). Peculiarly, the [l] before an overt WM is palatalized (cf. aquél+o/a --> aquéllo/a).

(10) Syllable Addition:

Following is the full derivation of all the forms in question.

(11)

	N Nom	M Nom	F Nom	N Art	M Art	F Art	N Acc	M Acc	F Acc	
1.	l+WM	l+WM	l+WM	l+WM	l+WM	l+WM	l+WM	l+WM	l+WM	UR
2.	l+WM	l+WM	l+WM							SA

3.	é-1+WM	é-1+WM	é-1+WM								10
4.	é-lo	é-lo	é-la	lo	lo	la	lo	lo	la		WM
5.		é-1			*l						Ap
6.					el						Ep
7.	ello		ella								Pa
8.	\$ \$ \$	\$ \$	\$ \$	\$	\$	\$	\$	\$	\$	\$	RS
9.	ello	él	ella	lo	el	la	lo	lo	lo	la	SR

Forms shown in step 1 are the underlying representation (UR): l+WM. Step 2 is the stress assignment (SA) and it only applies to nominative pronouns but to neither definite articles nor accusative clitics since the latter two are in [-stress] position and they cannot exist as independent words, i.e., nonpronominalized articles and clitics cannot be used in isolation without the head of the NP and VP, respectively, e.g. *el 'the' (cf. el libro 'the book'), *lo 'it' (cf. lo terminé 'I finished it'). However, given the underlying nonsyllabic l, rule (10) applies to add a stressable unit to the prosodic word here. Regular WM is spelled out in step 4. Apocope (Ap) takes effect only on the masculine nominative pronoun and article but not on their accusative counterpart. (This point will be exemplified later.) After apocope, the masculine singular definite article in step 5 cannot be left stranded as *l; therefore, the consonant is first parsed as a possible coda according to the unmarked Possible Syllable Structure Condition of Spanish, hence its nucleus vowel is filled in with the Spanish unspecified vowel [e]. Finally, the [l] of specifiers is palatalized when it stands before an overt WM. Lexical Resyllabification (RS) in step 8 brings out the surface forms.

The above derivation also accounts for the stressed masculine singular nominative pronoun él and the unstressed masculine singular definite article el. That is, the epenthetic form naturally does not receive stress given its stressless position. Postulating the epenthetic [e] of definite article is also supported by the fact that the vowel in question does not show up in contraction with a monosyllabic preposition which precedes such as a 'at, to' and de

'of, from', e.g. a *el --> al; de *el --> del while contraction is impossible in stressed forms, e.g. a é1 --> *al; de é1 --> *del.

The epenthesis to a stranded nonsyllabic consonant readily accounts for the change from the feminine definite article la to el in front of a stressed [á] of a following feminine noun. I propose to dispense with Harris' diacritic [á...]_{MOU}. First, it is peculiar why it is only the stressed [á] and not, say, unstressed [a] or other [+/-stressed] vowel. Secondly, there is no explanation why the switch should be to the masculine singular form and not others even though the gender of the article in question is still feminine in accordance with its following noun. Finally, I claim that apocope and truncation before [á...]_M are separate processes. Moreover, the two rules are ordered before and after the rule of pronominalization, respectively. Hence the distribution: el á1to, lo á1to, and la á1ta (but el á1ma, *la á1ma) is accounted for. The first two points are described as follows.

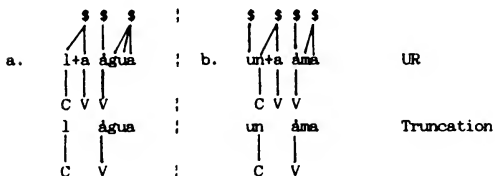
The WM of the feminine singular definite and indefinite articles la and una is truncated in front of a following stressed vowel of exactly the same shape (cf. rule (12)) while other vowels will not cause vowel deletion. (13a, b) are sample derivations of the la - el replacement.

(12) Truncation:

a --> Ø /]_{spec} X

Condition: X = head N'', feminine sing. and beginning with [á]

(13)



el	:	-	Epenthesis
§	§	§	Resyllabif.
∧		∧	
el	águá	un	áma
	:		SR

After truncation of the feminine WM, the remaining onset [l] is stranded in the same fashion as the [l] of the masculine singular definite article after apocope has applied. Hence, epenthesis follows automatically to remedy the situation. It is not accidental, then, that the resulting form of definite articles in both cases is the same el given that the WM of lo and la suffers phonetic loss (through apocope and vowel truncation, respectively) and the epenthetic vowel to prevent further loss is the unspecified vowel [e]. An apparent switch in gender of the indefinite article una --> un before a stressed [á] is also due to vowel truncation and not by either the disagreement rules or the referral rules.

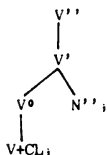
It must be distinguished that apocope is a more general rule which is obligatory to all specifiers or the materials inside Spec, while vowel truncation is obligatory only to determiners and optional to other specifiers. The optionality of vowel truncation is exemplified in mócha águá 'much water', tánta (h)ambre 'a lot of hunger', ésta áma 'this mistress', where the adjacent low vowels can be pronounced as two separate vowels or as one single vowel. Harris' observation of the differing aquélla águá vs. aquél águá 'that water' is borne out from our prediction (Harris 1987:181, fn. 7). Of course with an additional palatalization of [l] where no vowel truncation applies according to the present analysis.

4. Postlexicon

4.1. Lexical Allomorphy Rule and Postlexical Apocope, Vowel Truncation and Epenthesis:

As mentioned earlier, the feature Spec for the applicability vs. nonapplicability of apocope to the UR l+WM can be explained in syntactic terms. Specifically, the rule cannot operate on accusative clitics because they neither originate in nor can they be preposed to Spec position. Accusative pronouns are clitics and they cannot exist as separate words but are cliticized to verbs. I follow Zagona's 1987 proposal for the structural description of the cliticization rule as shown below.

(14)



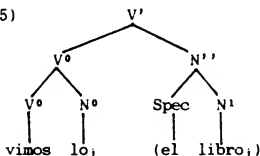
a) Clitic bears Case feature.

b) Clitic Spellout: [+CASE] -->

[α PERSON, β NUMBER, γ GENDER]

The following example is an approximation to Zagona's rule.

(15)



(Assignment to N° sister in syntax)

The accusative noun (el libro) contrasts with the accusative clitic (lo) in that the specifier of the noun form is subject to apocope due to its being a specifier before a masculine singular N both belonging to the same maximal projection, i.e. N'', while the clitic must be spelled out by the cliticization rule which spells

out the case assigned by the verb maintaining the same person, number, and gender as its antecedent. In morpho-phono-syntactic terms, the form chosen is lo/a(s) and not the stressed form because clitics are in [-stress] position. Moreover, there is no apocope here, given that the clitic pronoun is cliticized to the verb which does not meet the structural description of the rule, regardless of the position of the clitic to the verb, as proclitic or enclitic.

The allomorphy rule of specifiers is the same lexical rule as the one which selects the proper WM of a lexical item, including that of the specifiers. This predicts that in the lexicon, we have the [+stress] selection éllo, élla, éllós, éllas as well as the [-stress] alternants lo, la, los, las. In contrast, variations such as lo - el and la - el (before [á]) which are caused by apocope/vowel truncation and the subsequent epenthesis are morphosyntactic rules since the structural description for their operation must include syntactic information. Thus, the latter processes are found in the postlexical component.

4.2. Neuter = pro-Head N'' and Pronominalization:

In the following section, three points will be argued for. (i) to replace the feature [+neuter] gender of specifiers and pronouns, (éllo, lo; ésto, éso, and aquéllo), with the notion "pro-Head N''" (or "headless N''"). This correctly accounts for the ungrammaticality of forms such as *~~(él)~~lo hombre 'the man' (cf. el hombre), *~~ésto~~ libro 'this book' (cf. este libro), etc. (ii) to falsify the apparent existence of the neuter gender given that the neuter exponence is, in fact, a morphophonological variant of the unmarked masculine singular gender and number with all its morpho-phono-syntactic properties still left intact, e.g. lo bueno (*lo buena, *lo buenos, *lo buenas; *lg bueno, *los bueno, *las bueno). The masculine singular features are clearly seen in the correlation between the headless specifier and the adjective. (iii) to prove that specifiers are not themselves pronominals but rather

they can be pronominalized via deletion of the head of NP, e.g. el hombre bueno 'the good man' --> el bueno 'the good one'.

A. Lexical lo/a vs. Postlexical el

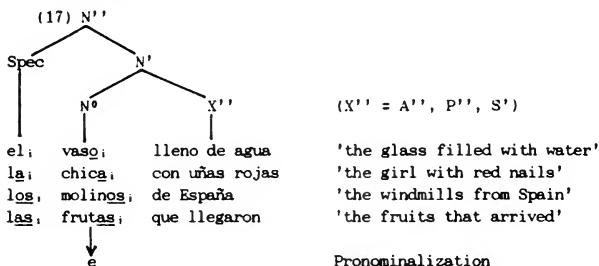
Points (i) and (ii) above are illustrated below. Since the Spec position is a stressless position, the form chosen must be the weak one: l+WM (and not the strong counterpart: él+l+WM). We will consider the derivation of specifiers in the structure: Spec + Head N'' + X'' (X = any complement/modifier phrase).

	(16) m. sg.		f. sg.		neuter sg.
	l+WM libr+WM buen+WM	;	l+WM ál+m+WM buen+WM	;	l+WM pro buen+WM UR
1.	lo libro bueno	;	la álma buena	;	lo pro bueno WM
2.	l	;	-	;	- Ap
3.	-	;	l	;	- VT
4.	el	;	el	;	- Ep
5.	el libro bueno	;	el álma buena	;	lo bueno SR
	'the good book'	;	'the good soul'	;	'the good (thing)'

All WMs are spelled out in step 1: the m.sg. [o], the f.sg. [a], and in the presence of a 'pro' head, the default m.sg. [o] for the so-called "neuter sg." (cf. also the [o] ending of the strong form éllo and the deictics: ésto, éso, and aquélllo). The masculine and feminine singular definite articles lose their WMs via apocope and vowel truncation, respectively (steps 2 and 3) while the two rules are inapplicable to the neuter article since it stands before a pro. (The head is phonetically absent given that it is neither identifiable nor is there a corresponding overt lexical noun as it often refers to an abstract idea, usually rendered as 'thing/part' in English.) The above derivation also shows the agreement of the Spec with the Head N'' and X'' (or the adjective here).

B. Pronominalization and Lack of Apocope/Vowel Truncation

I postulate that pronominalization⁹ in Spanish is done via deletion of Head N'. It is possible in Spanish but not in English due to the rich inflection on the Spanish determiners. In syntactic terms, this is done by coindexing the determiners with the head, thereby, encoding features such as: [α CASE, β NUMBER, γ GENDER] onto the specifiers. Thus, structurally, specifiers must be represented under N', or N^{max}, for reasons of c-command. Giorgi 1985 argues for a structure similar to the one represented below.



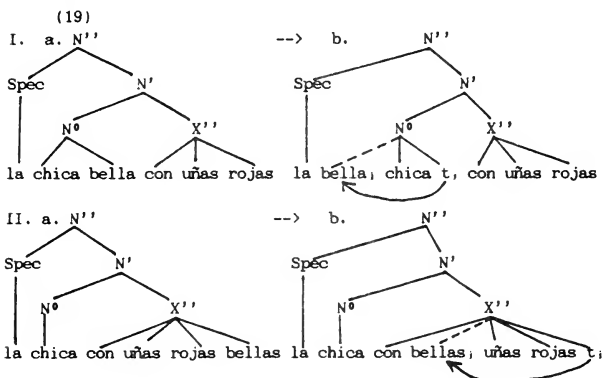
Giorgi 1985 proposes the above structure for the NP in Italian. What concerns us here is the fact that such a structure maintains the basic regularity expressed in (18):

- (18) If an anaphor α c-commands its antecedent β no principle B or C violation arises.

It is clear from (18) that Spec c-commands everything else dominated by N'. Therefore, deletion of the antecedent under N° is possible after coindexing it with the specifier, while in English, the position must be filled by a pronominal due to lack of inflectional percolation), e.g. el lleno de agua, la con uñas rojas, los de España, las que llegaron, and so on. Coindexing between the

specifier and the Head N'' in the process of pronominalization also accounts for the obligatory retention of specifiers e.g. Voy a ver la película clásica y la moderna. 'I am going to see the classic film and the modern one.' (cf.y *moderna.).

The intervening node N' is important due to the fact that such a structure allows the N' to take a complement under it whereas modifiers such as adjectives must be dominated by N^0 . In addition, representing distinct levels of domination, as shown below, predicts the ungrammaticality of la chica con uñas rojas *bella 'the pretty girl with blue eyes' given that movement of adjectives must be done within the same domain (cf. la chica bella/la bella chica con uñas rojas in (19.I.a, b)) or to account for their differing meaning to la chica con uñas rojas bellas/bellas uñas rojas 'the girl with beautiful red nails' in (19.II.a, b).



The proposed structure generalizes the contrast between the [+specified] vs. the [-specified] gender form of specifiers according to the distinction deleted vs. null head of N'' in complex NP structures (cf. 20.I) and headless relative clauses (20.II). That

is, for the [+specified] gender and number, the allomorphy rule correctly supplies the masculine/feminine WM depending on a given case whereas the [-specified] gender and number, i.e. [o], is supplied in accordance with 'pro' which is [-specified] also for gender and number.

(20)

I. a. l+WM hombre bueno	b. l+WM pro bueno	UR
lo	lo	WM
l	-	Ap
el	-	Ep
↓ e	-	Pron
el bueno	lo bueno	SR

II.a. l+WM hombre que es bueno	b. l+WM pro que es bueno	UR
lo	lo	WM
l	-	Ap
el	-	Ep
↓ e	-	Pron
el que es bueno	lo que es bueno	SR

Resistance to apocope and/or vowel truncation also finds explanations in the deletion of head N'. Thus, the proposed analysis predicts the application of vowel truncation in forms like la álma --> el álma 'the soul' (where there is no intervening pronominalization), but lack of it as a consequence of the intervening pronominalization la álma pura --> la pura 'the pure soul --> the pure one' (*el pura) and la álma álta --> la álta 'the high soul --> the high one' (*el álta), provided that the following [á] is not a head of N' or that the specifier has a zero block up. To illustrate the distinction, I offer the derivation of el álto 'the tall (one), m.' as well as lo álto 'the tall (thing)', and la álta 'the high (one), f.'. (Harris' rule cannot distinguish el álto vs. lo álto and it must be specified as [+pronominal/ +masculine] to bar the incorrect form *el álta for la álta.

(21)

a.	1+WM	chic+WM	áIt+WM	;	b.	1+WM	pro	áIt+WM	;	c.	1+WM	áIm+WM	áIt+WM	
1.	lo	chico	áIt	;	lo	pro	áIt	;	la	áIma	áIt	WM		
2.	l			;	-			;	-				Ap	
3.	el			;	-			;	-				Ep	
		↓		;				;	↓					
4.		e		;	-			;	e				Pr	
5.		-		;	-			;	-				VT	
6.	el	áIt		;	lo	áIt		;	la	áIta			SR	

The WMs of all the specifiers are spelled out as expected. Apocope is applicable to only specifiers before a non-null masculine singular Head N'', thereby ruling out any change in (21b, c). Epenthesis automatically adjusts the apocopated specifier. Pronominalization has the effect of deleting the head. Therefore, the resultant forms of (21a, c) at this point are el áIt and la áIta, respectively. At step 5, vowel truncation cannot take effect in any of the three representations because the specifiers no longer stand before a Head N''. Nevertheless, in case there is no pronominalization in step 4, the prediction of vowel deletion on la áIma, yielding éI áIma is borne out given an overt head.

Finally, the proposal made in this paper additionally accounts for the fact that certain quantifiers and deictics are sometimes used as postnominal adjectives with an apparent resistance to apocope in the example in (22.I) and with the co-occurrence of a determiner and a quantifier/deictic in both examples.

(22)

- I. a. un hombre 'a man' --> b. el hombre uno 'the #1 man'
 II. a. este hombre 'this man' --> b. el hombre éste 'this man'

Specifically, (22.I.a) contrasts (22.I.b) in meaning since 'uno' has two (or more) separate lexical entries: 'a/an, indefinite article/quantifier', and 'number one', among others, and each takes up its corresponding place as specified in the lexicon. That is, the

quantifier precedes the noun and is sensitive to apocope while the latter is employed as a postnominal modifier. No movement is involved here (cf. el hombre ón). However, for (22.II.b), the specifier moves out of its original position to obtain more stress relative to the head of NP. This is patterned after the structure Head N'' + Adj. where the head is not the peak of the prosodic phrase but the attribute is since Spanish is focus-final.¹⁰ This is confirmed by the fact that contrastive adjectives that differentiate the nouns they modify from the rest in their classes are postnominal and never prenominal, e.g. el profesor generoso 'the generous professor', given that preposed adjectives cannot make such a contrastive distinction. The only effect achieved by the stylistic preposing of adjectives is to emphasize the specific quality conveyed by the meaning of the employed adjective, e.g. el generoso profesor. This is done via the marked word order, i.e. Adj. + Head N'' which is irregular for descriptive adjectives, and not by the change of the stressed element. Thus, preposed adjectives are prosodically procliticized to the stressed unit which usually is at the end of a prosodic phrase.

5. Conclusion

I hope to have outlined a full account of the specifier class in order to supplement Harris' 1987 proposal. The distribution in forms of these specifiers is independently motivated as support can be drawn from other related phenomena: apocope, epenthesis, and pronominalization of specifiers¹¹ regulated by the postlexical phonology and syntax. It is also to confirm Harris' claim that the change of the definite article from la to el before [A] is not done via a disagreement rule or referral rule. The apocope and the prosody for the truncation of the masculine WM and the addition of an initial syllable of the UR l+WM, respectively, can be translated in syntactic terms in that these morpho-phonology-syntax interactions are sensitive to the Spec position and a nonnull masculine singular Head N''.

NOTES

* I wish to thank Michael Kenstowicz for his valuable comments on an earlier draft of this paper. All errors of fact or interpretation are my responsibility.

¹ The problem struck me as interesting and I was able to draw a lot of generalizations while I was working on the relations between stress assignment and apocope in forms like algún --> algún. This paper reacts to a later reading of Harris 1987.

² In addition, Posner 1985 approaches the problem from a diachronic viewpoint.

³ The use of a written accent mark in this paper is simply to indicate the stressed syllable. It is not intended to correspond to the orthographic accent mark in Spanish. Moreover, phonetic transcription is employed when it is necessary to illustrate a given point.

⁴ I employ the feature WM to cover also the apocope found in word-final vowel other than [o]. Examples are grande 'big, adj. m. f.', and cualquiera 'whatever, adj. m. f.' which are sporadically apocopated to gran, and cualquier, respectively, before a nominal of either gender. These two lexical items are highly idiosyncratic to the proposed generalization here given that pre- vs. post-nominal grande do contrast in meaning, e.g. gran hombre 'great man' vs. hombre grande 'big man'. Moreover, the Possible Syllable Structure Condition would rule out apocope in grande --> *grand since it would end in a consonant cluster. Two alternatives are then available here. Grande either undergoes cluster simplification by dropping out the final consonant or it breaks from the preceding syllable to form a heterosyllable with an epenthetic [e]. The results are gran and the form apparently resistant to apocope grande, e.g. gran/grande

hombre, gran/grande ocasión 'great occasion, f.', gran/grande sacrificio 'immense sacrifice, m.', gran/grande desgracia 'tremendous misfortune, f.' However, according to Ramsey 1956, this is due to the fact that "the natural effect of emphasis is to give to a word its fullest form." (Ramsey 1956:137). Additionally, the plural form of cualquiera is the exceptional apocopated cualesquier preceding a plural nominal and the full form cualesquiera both before and after a noun. Another idiosyncratic apocope is found in sán from santo which retains its full form in the phonological environment of to- or do- of a following head of NP, e.g. Sán Páblo, Sán Antónyo but Santo Tomás, Santo Domingo, etc.

⁵ Unlike English, a series of two or more adjectives must be coordinated by y 'and', in Spanish.

⁶ Harris 1983 proposes depalatalization to account for the relationship of underlying [ll] to surface [l] and also [ñ] --> [n].

⁷ Following Harris 1987, I leave the problem of palatalization in this case to future research.

⁸ Although the expression lo hombre 'the manhood' may be acceptable to some speakers, it is not to be confused with the ungrammatical form here. Lo hombre patterns after lo + adj., e.g. lo mejor 'the best part', and the nominal hombre here is adjectivalized by zero affixation. The noun must be employed as an adjective. One common example is lo caballero 'characteristics of being a gentleman'. Some speakers accept less common examples such as lo niño 'childishness', and lo mujer 'characteristics of being a woman', while others reject them.

⁹ Such a transformation is possible since there is no real change in meaning between the full NP and the pronominalized version. That is, the deleted noun is always recoverable at the discourse level, e.g. el hombre bueno 'the good man' vs. el bueno 'the good one', las canciones antiguas 'the old songs' vs. las antiguas 'the old ones, etc. In lo bueno, on the contrary, no

transformation is claimed given the presence of a null head both underlyingly and on the surface. The contrastive meaning el bueno vs. lo bueno is in its underlying overt vs. 'pro' head of NP.

¹⁰ At the sentential level, Contreras 1978 claims that Spanish is 'focus-final'. By implication, this may also apply to phrasal units. I hope this proposal will stimulate future investigations.

¹¹ Harris' 1987 morphological explanation of cases of apparent application of the el-la replacement in compound nouns such as el aguafuérte 'nitric acid' (from agua+fuérte), el aguamála 'jellyfish' (from agua+mála), and in diminutives, e.g. el agüita 'water, dim.' (from agua+ita), el amita 'mistress, dim.' (from ama+ita) reflects a stratified lexicon, similar to the one suggested in Wong-opasi 1987a. We must either claim that these items are formed at the syntactic level or they reenter the lexicon with the article assigned to the base representations. The former position is probably assumed by Harris for his distinction: stem- vs. word-level affixation, while lexicalization in the latter view is allowed in Wong-opasi 1987a.

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Preface

With the present issue, the Department of Linguistics, University of Illinois at Urbana-Champaign, is beginning to publish *Studies in the Linguistic Sciences* in a new format, produced entirely on the computer and printed out on the Apple Laserwriter, using Apple's 'Helvetica' as the base font. While the production of this issue may show some signs of transitional difficulties, the Department hopes that these will in fact be transitory and that, at any rate, the 'new improved' format will meet with the readers' approval.

In the production of this issue I have been helped by the following members of the Department of Linguistics faculty who acted as referees for submitted papers: Chin-Chuan Cheng, Georgia Green, Erhard Hinrichs, Yamuna Kachru, Charles W. Kisseberth, and Jerry Morgan. The Department also appreciates financial support from the College of Liberal Arts and Sciences toward publishing this issue, and technical support from the Language Learning Laboratory, especially the support provided by Jim Gothard and by the Director of the Language Learning Laboratory, Chin-Chuan Cheng. Last, but not least, I have the pleasant duty of thanking Norma Barton, Beth Creek, Jerri Rogers, and Eileen Sutton of our Department for their support in preparing this issue.

February 1989

Hans Henrich Hock (Editor)

SYLLABLE PATTERNS IN LEVANTINE ARABIC*

Issam M. Abu-Salim and Hassan R. Abd-el-Jawad

A quantitative analysis of the actual word syllable-patterns that occur phonetically in Levantine Arabic is given in this article. The analysis is based on an examination of the syllable structure of all the words found in Stowasser and Ani 1964. The frequency and distribution of the five phonetic syllable types in all the syllable patterns are calculated and discussed. It is shown that the frequency and distribution of syllables are determined by their weight and the degree to which they are altered by phonological rules. It is also shown that the application of phonological rules may be influenced in some cases by the availability or absence of certain syllable patterns.

Introduction

This study aims at describing and analyzing the syllable structure of words in Levantine Arabic (henceforth, LA) in terms of the syllable patterns they have. The term 'syllable pattern' is used here to refer to the number and type of syllables words consist of. Words like *katab* 'he wrote', *?akal* 'he ate', and *samak* 'fish', for instance, have the bisyllabic pattern CV.CVC, whereas words like *katab-u* 'they wrote', *?akal-o* 'he ate it (m.)', and *samak-e* 'a fish' have the trisyllabic pattern CV.CV.CV. All the phonetic syllable patterns found in LA along with examples illustrating them are given in the appendix at the end of this paper.¹

The data used for this research was drawn primarily from Stowasser and Ani 1964.² All the words in this dictionary were examined in order to find out all the possible combinations of syllables that LA words may consist of. In addition, we had to consider inflected and derived forms of lexical items so as to exhaust all the possible syllable patterns. These included the following:

a) The regular dual and plural forms of nouns and adjectives, which are formed by the addition of the dual and plural suffixes, respectively, to the singular forms, as in *maktab-een* 'two offices', *ta9ban-iin* 'tired (m.pl.)', and *za9lan-aat* 'angry (f.pl.)'.

b) The possessive forms of singular, dual, and plural nouns, which are formed by the addition of pronominal suffixes to the nominal stems, as in *Tawit-o* 'his table', *Taawlit-ha* 'her table', and *Taawl-aat-hum* 'their tables'.

c) The definite forms of nouns and adjectives, which are formed by the addition of the definite article /l-/ to the nondefinite form, as in *?il-walad* 'the boy' and *?il-9aali* 'the high (m.sg.)'.³

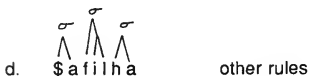
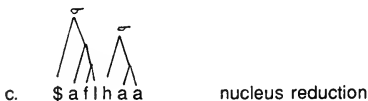
d) The conjugated forms of perfect and imperfect verbs with all the possible subject and object pronominal affixes, such as *sa?l-at* 'she asked', *sa?al-u* 'they asked', *sa?al-ha* 'he asked her', *sa?al-uu-hum* 'they asked them', *sa?l-at-o* 'she asked him', *bi-s?al* 'he asks', and *bi-s?al-u* 'they ask'. Verbs with the negative suffix /-ʃ/ were also considered, such as *bi-s?al-iʃ*⁴ 'he doesn't ask', and *bi-s?al-uu-ʃ* 'they don't ask'.

The phonetic syllable types that occur in LA are CV, CVV, CVC, CVVC, and CVCC (Abu-Salim 1982, Cowell 1964, Haddad 1984, Kenstowicz 1985, 1986). These syllable types are illustrated by the following examples:

(1) CV	katab	'he wrote'
CVV	Taalab	'he demanded'
CVC	ma19ab	'playground'
CVVC	muftaaH	'key'
CVCC	?akaltha	'I ate it (f.)'

Heavier syllables, such as CVVCC, do not occur in LA at the phonetic level. The CVVCC syllable may, however, arise at the underlying level, but it is subsequently reduced to CVCC by a rule of nucleus reduction that applies as part of the syllabification mechanism to ensure that the output is properly syllabified, given the five phonetic syllable types above. A word like *\$afilha* (< /\$aaf-l-haa/) 'he saw for her' is accordingly derived as follows:

(2) a. /\$ a a f l h a a/



In (2a) the dative suffix /-l/ can only be syllabified in the coda of the first syllable due to a constraint limiting the number of consonants in the onset to just one. This syllabification method results in a CVVCC syllable which is not allowed phonetically as mentioned earlier. The nucleus reduction rule subsequently applies to the outcome of (2b), changing the CVVCC syllable into the acceptable CVCC syllable. (For more details on this analysis see Abu-Salim 1982, and for an alternative analysis see Kenstowicz 1986.)

The examination of all the words considered for this study showed that words in LA may consist of 1-7 syllables. Theoretically, the number of combinations of the five syllable types into words 1-7 syllables long is 5^7 , which is equal to 78,125 different syllable patterns. But the actual phonetic syllable patterns found in LA are just 440, which is only 0.56% of the theoretically possible patterns. This low percentage of the actually occurring phonetic syllable patterns to the theoretically possible patterns is due to a number of factors, one of which is the application of phonological rules. We will see that rules such as vowel shortening and syncope result in reducing words and, consequently, decreasing the number of syllable patterns in LA. The diachronic loss of inflectional endings and the neutralization of some affixes and function words may also be cited as possible explanations for the small number of syllable patterns currently found in LA. It is beyond the scope of this study, however, to discuss the diachronic factors in detail.

The remainder of this paper is organized as follows: First, the frequency of the five syllable types in the 440 actual syllable patterns is given. This is followed by a section on the frequency of the seven syllable-pattern categories. The distribution and frequency of every syllable type in each syllable-pattern category and each position of the word are then given and briefly discussed.

Syllable frequency

The total number of syllables found in the 440 patterns is 1910 syllables of the five types given above. The frequency of each syllable type was determined by calculating the number of its occurrences in every category of word-size patterns (monosyllabic, bisyllabic, etc.). In the five monosyllabic word patterns, each syllable occurs only once, so the five syllable types may be said to have the same frequency in this category of word patterns. In longer syllabic patterns, the five syllable types differ in their frequency, as shown in Table 1 (next page), where M, B, T, Q, P, H, and S are used to stand for mono-, bi-, tri-, quadri-, penta-, hexa-, and septasyllabic word patterns, respectively.

The table shows that the CV syllable is by far the most frequent (701 occurrences) and that the CVCC syllable, as expected, the least frequent (130 occurrences). The second frequent syllable is the CVC syllable, followed by the CVVC, and then the CVV syllable. That the CV syllable is the most frequent and the CVCC syllable the least frequent does not require much of an explanation. The CV syllable is crosslinguistically the most natural, or least marked, whereas

the CVCC syllable is much less natural, or more marked (Sloat *et al.* 1978, Cairns and Feinstein 1982).⁵

	M	B	T	Q	P	H	S	Total
CV	1	10	68	174	272	139	37	701
CVV	1	7	40	50	55	22	9	184
CVC	1	10	61	153	237	145	45	652
CVVC	1	9	43	81	81	23	5	243
CVCC	1	8	31	46	35	7	2	130
Total	5	44	243	504	680	336	98	1910

Table 1: Syllable frequency

But the lower frequency of the CVV syllable, when compared to that of the CVVC syllable, requires an explanation. One reason behind the relatively low frequency of the CVV syllable is that it systematically undergoes a vowel-shortening rule, whereby its long vowel is reduced to short, thus changing a CVV syllable into CV and, consequently, increasing the frequency of the CV syllable relative to that of the CVV syllable, in particular, and the other syllables, in general. In Palestinian Arabic, for instance, CVV syllables are generally shortened when they occur in unstressed weak positions: *báab* 'door', *babéen* (< /baa.been/) 'two doors', *mabsúuT* 'happy (3 m.sg.)', *mabsuTiin* (< /mab.suu.Tiin/) 'happy (3 m.pl.)', *sarií9a* 'fast (3 f.sg.)', *sari9áat* (< /sa.rii.9aat/) 'fast (3 f.pl.)'. The CVV syllable also undergoes reduction in word-final position: *sá?al-u* 'they asked' (cf. *sa?al-úu-ha* 'they asked her'), *sa?ál-ni* 'he asked me' (cf. *ma-sa?al-nii-š* 'he didn't ask me'). (For more information on vowel shortening in Palestinian Arabic see Abu-Salim 1986.) Note that long vowels shorten only in weak open syllables; in checked syllables, they remain long.

Table 1 also shows that there is no one-to-one correspondence between syllable weight and frequency of occurrence. Although both CVV and CVC syllables are considered as having the same weight (McCarthy 1979), the CVC syllable is systematically more frequent in all syllable patterns. In addition to the vowel-shortening rule which lowers the frequency of the CVV syllables as illustrated above, there is a syncope rule in LA that increases the frequency of the CVC syllable. This rule deletes short high vowels in unstressed open syllables (Brame 1973, 1974, Cowell 1964, Haddad 1984, Kenstowicz and Abdul-Karim 1980, among others) as the following examples show:

- (3) a. \$írib 'he drank'
 b. \$írb-at 'she drank'
- (4) a. fíhim 'he understood'
 b. fíhm-ak 'he understood you (m.sg.)'

(3b) and (4b) have the underlying representations /\$írib-at/ and /fíhim-ak/, respectively, and both have the underlying syllable pattern CV.CV.CVC. When syncope applies to the penultimate vowel in both examples, the onset of the second syllable is resyllabified with the preceding syllable, thus resulting in the phonetic syllable pattern CVC.CVC., with an initial CVC syllable instead of the underlying CV syllable.

The same discrepancy holds true for CVVC and CVCC, which are also viewed as having the same weight (McCarthy 1979). The former syllable is systematically more frequent than the latter in all syllable patterns. This is partly due to the application of the syncope rule mentioned above, which results in creating CVVC syllables from underlying CVV plus the onset of the following syncopated CV syllable, as the following examples show:

- (5) a. ráa.yiH 'going (3 m.sg.)'
 b. ráay.H-a 'going (3 f.sg.)'
 c. raay.H-íin 'going (3 m.pl.)'
 d. raay.H-áat 'going (3 f.pl.)'

The underlying form of the stem in (5b,c,d) is /raayiH-/ which has an initial CVV syllable followed by a CV syllable (H is syllabified in the onset of the last syllable.). The application of syncope and resyllabification to the underlying forms results phonetically in initial CVVC syllables, as the following partial derivation of (5c) shows:

- (6) /raayiHiin/
 raa.yi.Hiin syllabification
 raa.yi.Híin stress
 raa.y.Híin syncope
 raay.Híin resyllabification

Another phonological rule that lowers the frequency of CVCC and, consequently, increases the relative frequency of CVVC syllables is epenthesis. In LA, this rule inserts a high front vowel between two unlike consonants when they occur in word-final position or followed by a consonant-initial suffix (Abu-Salim 1980, Brame 1973, Haddad 1984, Kenstowicz and Kisseberth 1979, among others). In other words, the heavy coda of a CVCC syllable is split up by an epenthetic vowel in the environment described above, as illustrated by the following examples:

- (7) a. jísir 'bridge'
 b. jísir-na 'our bridge'
 c. jír-éen 'two bridges'

Epenthesis and resyllabification in (7a,b) result in the decomposition of an underlying CVCC syllable into phonetically two syllables of the form CV and CVC. This has, of course, the consequence of increasing the frequency of both the CV and CVC syllables and decreasing the frequency of the CVCC syllable compared to that of the CVVC syllable.

To sum up, a number of phonological rules conspire to bring about the discrepancy observed in the frequency of the heavy syllables CVV and CVC, on the one hand, and the superheavy syllables CVVC and CVCC, on the other.

Syllable-pattern frequency

Table 2 below gives the number of syllable patterns in each word-size category and its percentage relevant to the total number of all syllable patterns.

Word category	No. of patterns	Percentage
Monosyllabic	5	1.13%
Bisyllabic	22	5.00%
Trisyllabic	81	18.41%
Quadrisyllabic	126	28.64%
Pentasyllabic	136	30.91%
Hexasyllabic	56	12.73%
Septasyllabic	14	3.18%

Table 2: Syllable-pattern frequency

This table shows that the pentasyllabic patterns are the most frequent and the monosyllabic patterns are the least frequent. The order of the other patterns in terms of frequency is as in the following hierarchy:

Most frequent Least frequent
 P Q T H B S M

Table 2, however, does not imply anything about the frequency of words under each of the 440 syllable patterns. It simply compares the number of syllable patterns in each word-size category to those of the other categories and to the total number of patterns in all categories.

Syllable distribution

In this section, the distribution of every syllable type in word-initial, medial, and final is examined in order to find out the frequency of these syllables in the three word positions and to see if there are any constraints governing their distribution in all syllable patterns.

a) The CV syllable

Table 3 below gives a summary of the number of occurrences of the CV syllable in word-initial, medial, and final position in all syllable patterns, except, of course, the monosyllabic patterns. The table shows that there are no constraints on the distribution of the CV syllable in any position in any word patterns. It occurs freely in initial, medial, and final position in all word sizes. The CV syllable is, of course, more frequent in the pentasyllabic word patterns because, as we have seen above, the pentasyllabic patterns are the most frequent of all the syllabic patterns. It is also more frequent in medial position due to the fact that in long words there are more medial than initial or final syllables. This is in harmony with the fact that this syllable type is the most natural and least marked syllable in language.

	B	T	Q	P	H	S	Total
I	5	24	59	86	42	4	220
M	-	20	75	148	84	27	354
F	5	24	40	38	13	6	126
Total	10	68	174	272	139	37	700

Table 3: CV distribution

b) The CVV syllable

There are some constraints governing the distribution of the CVV syllable in LA. The distribution of this syllable type is summarized in Table 4 (next page). The table shows that this syllable is less frequent in final position than in the other two positions, and that it is much more frequent in medial position than in the other two positions. There are, moreover, some restrictions on its occurrence in long words. It does not occur in initial position in hexa- and septasyllabic words, and in final position it is limited to just the bi- and trisyllabic words. Table 4 also shows that this syllable is more frequent in pentasyllabic patterns than in the other patterns, and that it is least frequent in bi- and septasyllabic patterns.

	B	T	Q	P	H	S	Total
I	4	16	11	2	-	-	33
M	-	14	39	53	22	9	137
F	3	10	-	-	-	-	13
Total	7	40	50	55	22	9	183

Table 4: CVV distribution

The reason behind the high frequency of the CVV syllable in medial position is that there are more medial than initial or final syllables in multisyllabic words. The low frequency of this syllable in final position, on the other hand, is due to the vowel-shortening rule mentioned earlier. In final position, underlying CVV syllables in Arabic, along with the CVC syllables, behave as light for purposes of stress assignment, and, therefore, they do not receive stress (Kenstowicz 1983, McCarthy 1979, 1980). The absence of stress on final CVV syllables leads to their reduction to CV by vowel shortening (Abu-Salim 1980), as illustrated by the following examples:

- (8) a. ráma (</ramaa/) 'he threw'
 b. kátabu (</katabuu/) 'they wrote'

The only situation where CVV syllables remain phonetically strong in final position is when they are underlyingly followed by a segment that is later deleted. In Brame (1971) and McCarthy (1979), for instance, examples like *ramáa* 'he threw it (m.)' and *ʔaxúu* 'his brother' are analyzed as having underlying structures with final /h/, which means that at that point such examples have final CVVC syllables. Stress is first assigned to the final superheavy syllable, followed by the deletion of the final /h/. This results in a representation with a final stressed CVV syllable, to which vowel shortening cannot apply, as illustrated by the following derivation of *ramáa*: (For more details on /h/ deletion see Brame (1971) and McCarthy 1979.)

- (9) /ramaah/
 ramáah stress
 ramáa /h/ deletion
 ---- vowel shortening

c) The CVC syllable

This syllable is like the CV syllable in its distribution: There are no constraints whatsoever on its occurrence in any position in the word or in the syllabic patterns, as the following table shows:

	B	T	Q	P	H	S	Total
I	5	22	47	46	12	10	142
M	-	18	71	146	107	31	373
F	5	21	35	45	26	4	136
Total	10	61	135	237	145	45	651

Table 5: CVC distribution

This table shows that the CVC syllable occurs freely in word-initial, medial, and final position regardless of the size of the syllabic pattern. It also shows that the CVC syllable is, as expected, more frequent in medial than in other positions, and also more frequent in the pentasyllabic patterns than in the others. The apparent explanation for this distribution is that there are more medial than final or initial word positions, especially in quadrisyllabic and longer patterns. The CVC syllable is also expected to occur more in the pentasyllabic patterns since they are the most frequent in LA.

A comparison between the two heavy syllables CVV and CVC shows that the former is by far more limited in distribution. We have seen that the vowel-shortening rule is largely responsible for this limitation.

d) The CVVC syllable

More constraints are found on the distribution of superheavy syllables. Table 6 below summarizes the distribution of the CVVC syllable:

	P	T	Q	P	H	S	Total
I	4	11	4	-	-	-	19
M	-	15	44	49	11	1	120
F	5	17	33	32	12	4	103
Total	9	43	81	81	23	5	242

Table 6: CVVC distribution

This table shows that this syllable is less frequent in word-initial position than in medial or final position. It does not occur at all in initial position in words

5-7 syllables long. It is also less frequent in the long hexa- and septasyllabic patterns than in the shorter patterns.

e) The CVCC distribution

There are also some constraints governing the distribution of this extraheavy syllable, as shown in the following table:

	B	T	Q	P	H	S	Total
l	4	8	5	2	2	-	21
M	-	14	23	12	-	2	51
F	4	9	18	21	5	-	57
Total	8	31	46	35	7	2	129

Table 7: CVCC distribution

This syllable is not as frequent in initial position as in the other positions. It does not occur initially in the septasyllabic pattern, and its frequency in initial position in the penta- and hexasyllabic patterns is very low. Unlike the other syllables, this syllable is most frequent in final position. Moreover, this syllable is more frequent in patterns 3-5 syllables long than in the other patterns.

One reason behind the low frequency of this syllable is the epenthesis rule mentioned earlier, which inserts a high front vowel between the two consonants in the coda of this syllable when they are nongeminate, thereby decomposing this superheavy syllable into light CV and heavy CVC syllables in examples like *jisir* (< /jisir/) 'bridge'. This rule of epenthesis not only lowers the relative frequency of the CVCC syllable, but also raises that of the other lighter syllables such as CVC.

Conclusion

We have tried in this paper to give a statistical analysis of the phonetic syllable patterns that occur in LA. This analysis has shown, among other things, that the syllable frequency and distribution are partly determined by syllable weight: the lighter the syllable the most frequent it is and the fewer the constraints on its distribution. This generalization works well for the light CV and the superheavy CVCC syllables. We have seen that the CV syllable is the most frequent and that there are no constraints whatsoever on its distribution in the word. The CVCC syllable, on the other hand, is the least frequent and has more limitations on its distribution.

Another factor that plays a major role in determining the frequency and distribution of syllables is the application of phonological rules. We have seen that the vowel-shortening rule has lowered the frequency of the CVV syllable to the extent that it has become lower than that of its heavy counterpart CVC and even lower than that of the heavier syllable CVVC. We have also seen that the syncope rule has lowered the frequency of the CV syllable and simultaneously raised that of the CVC syllable, thus narrowing the difference in the frequency of the two syllables. The same holds true for the CVCC syllable whose frequency is reduced and whose distribution limited by the epenthesis rule.

The application of phonological rules may, on the other hand, be influenced by the phonetic syllable patterns found in the language. The applicability or inapplicability of certain phonological rules may be triggered by the presence or absence of certain syllable patterns. The vowel-shortening rule mentioned earlier shortens the long vowel of a CVV syllable when it occurs in a weak metrical position (Abu-Salim 1986, Kenstowicz 1983). This rule applies to examples such as *SaHibto* (< /SaaHibato/) 'his friend (f.)', where the underlying initial syllable of the form CVV is reduced to CV, but fails to apply to examples such as *kaatábato* (< /kaatabato/) 'she corresponded with him', where the initial CVV syllable escapes shortening although it occurs in a weak metrical position. It is important to note that both types of examples have the same underlying syllable pattern and the same surface stress pattern. In spite of this, the rule has applied in the first case but not in the second. Examples such as *kaatábato* have been considered exceptions to the vowel-shortening rule (Abu-Salim 1986). This exceptional behavior has been explained as follows: If vowel shortening applied to *kaatábato*, it would yield the structure **katábato* with the syllable pattern CV.CV.CV.CV. which does not phonetically exist in LA. The vowel-shortening rule has, therefore, been blocked so as not to yield a syllable pattern that does not phonetically occur in the language.

NOTES

*An earlier version of this paper was presented at the first annual symposium on Arabic Linguistics, University of Utah, Salt Lake City, April 1987. We would like to thank Hans Henrich Hock and Charles Kisseberth for their valuable comments and suggestions. The following special symbols have been used in the transcription of Arabic words: /ʒ/ = voiceless interdental fricative, /ʃ/ = voiceless alveopalatal fricative, /z/ = voiced alveopalatal fricative, /b/ = voiced velar fricative, /h/ = voiceless pharyngeal fricative, /ʁ/ = voiced pharyngeal fricative, /t/ = emphatic voiceless alveolar stop, /d/ = emphatic voiced alveolar stop, and /s/ = emphatic voiceless alveolar fricative.

¹It is to be noted here that not all the examples given in the appendix are found in one particular variety of LA.

²The term 'Syrian Arabic' in the title of this dictionary is used to refer to the 'dialects and subdialects spoken by the sedentary population of Greater Syria', which comprises present-day Jordan, Lebanon, Palestine, and Syria (Stowasser and Ani 1964:i). We have decided to use the term "Levantine Arabic" in the title of this paper so as not to limit its scope to just the dialect(s) spoken in present-day Syria.

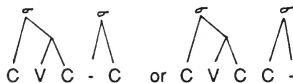
³The vowel /i/ preceding the definite article /l/ is inserted in some colloquial Arabic dialects to prevent generating syllables with two consonants in the onset. Since vowel-initial syllables are not allowed in Arabic, the glottal stop /ʔ/ is then inserted before the epenthetic vowel. Only in phrase-initial position, however, are two-consonant onsets phonetically possible in LA (Abu-Salim 1980, Cowell 1964, Haddad 1984, Kenstowicz 1985). Due to this limitation on their distribution, we decided to exclude all words beginning with two consonants.

⁴The vowel /i/ preceding the negative suffix /ʃ/ is also epenthetic.

⁵There have been some proposals for excluding the CVCC syllable from being part of the underlying syllable inventory of Arabic. McCarthy 1979, for instance, considers this syllable, as well as the CVVC syllable, as extraheavy, or superheavy, and, based on the constraints on its distribution in Classical Arabic and in some colloquial varieties which limit its occurrence to prepausal position, he proposes the derivation of this syllable from underlying CVC plus a following stranded unsyllabified consonant. This consonant is later adjoined to the preceding heavy syllable by a rule to give the following representation for the phonetic CVCC syllable:



Selkirk 1981 also argues for excluding the CVCC syllable from the underlying syllable inventory of some Arabic dialects. She offers, however, a different analysis, where the final consonant is treated at the underlying level as a syllable by itself, but with an empty nucleus, as shown below:



The empty nucleus is later filled by an epenthetic vowel /i/ in some colloquial dialects of Arabic. (For more details on these proposals see McCarthy 1979 and Selkirk 1981.)

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APPENDIX

The actual syllable patterns in LA

1 = CV, 2 = CVV, 3 = CVC, 4 = CVVC, 5 = CVCC

Monosyllabic patterns

PATTERN	EXAMPLE	GLOSS
1	wa/?u	'and'
2	\$uu	'what'
3	min	'from'
4	baab	'door'
5	bint	'daughter, girl'

Bisyllabic patterns

1.1	ma\$a	'he walked, went'
1.2	ramaa	'he threw it (m.)'
1.3	?asad	'lion'
1.4	ma9aa\$	'salary'
1.5	mamarr	'aisle'
2.1	raa?u	'they went'
2.3	Zaami9	'mosque'
2.4	baaloon	'balloon'
2.5	saaba?t	'I raced'
3.1	?ibra	'needle, pin'
3.2	\$uftuu	'you (pl.) saw him'
3.3	maktab	'office'
3.4	fusTaan	'dress'
3.5	\$aTranZ	'chess'
4.1	kaasto	'his glass'
4.2	taabloo	'dashboard'
4.3	Taabtak	'your (m.sg.) (foot)ball'
4.4	\$aaTriin	'clever (m.pl.)'
5.1	bi9tha	'I sold it (f.)'
5.3	?ultlak	'I told you (m.sg.)'
5.4	?ingliiz	'Englishmen'
5.5	mist9idd	'prepared (m.sg.)'

Trisyllabic patterns

1.1.1	katabu	'they wrote'
1.1.2	sa?aluu	'they asked him'
1.1.3	masakak	'he caught you (m.sg.)'
1.1.4	Talabaat	'orders, application forms'
1.1.5	makatap\$	'he didn't write'
1.2.1	?abuuha	'her father'
1.2.2	mubaaraa	'match, game'
1.2.3	bawaaxir	'steamers'
1.2.4	wilaayaat	'states'
1.3.1	maHaTTa	'station'
1.3.2	masaktuu	'you (pl.) caught him'
1.3.3	sa?altak	'I asked you (m.sg.)'
1.3.4	darabziin	'banister'

1.3.5	tamanTa9\$	'eighteen'
1.4.1	Habiibha	'her lover'
1.4.2	birasluu	'they correspond with him'
1.4.3	makaatbak	'your (m.sg.) offices'
1.4.4	mubiilyaat	'furniture'
1.4.5	bi\$aaawi\$\$	'he doesn't consult him'
1.5.1	?akaltha	'I ate it (f.)'
1.5.2	bikassruu	'they smash it (m.)'
1.5.3	Tabaxthum	'I cooked them'
1.5.4	?iilkroon	'electron'
1.5.5	bakattbi\$\$	'I don't make him write'
2.1.1	booyaZi	'bootblack'
2.1.2	raasaluu	'they correpond with him'
2.1.3	?aabalik	'he met you (f.sg.)'
2.1.4	saaba?uuk	'they raced you (m.sg.)'
2.1.5	baaromitr	'barometer'
2.2.1	?aaraami	'Aramaic'
2.2.3	beenaaton	'between them'
2.2.4	baaloonaat	'balloons'
2.3.1	?aabalto	'I met him'
2.3.2	Taawa9ii	'you (f.sg.) obeyed him'
2.3.3	jaawabtak	'I answered you (m.sg.)'
2.3.4	\$iikiyyiin	'Czechs (m.pl.)'
2.4.1	?aa\$uurya	'Assyria'
2.4.3	baaluunkum	'your (m.pl.) balloon'
2.5.1	naawaltha	'I handed (sth.) over to her'
2.5.3	9aatabthum	'I blamed them'
3.1.1	maktabe	'library'
3.1.2	bax\$a\$uu	'they bribed him'
3.1.3	mu?tamar	'conference'
3.1.4	maTrabaan	'jar'
3.1.5	?istafatt	'I benefited'
3.2.1	fallaal-ia	'peasant woman'
3.2.3	ba?duunis	'parsley'
3.2.4	?9laanaat	'ads'
3.3.1	musta\$fa	'hospital'
3.3.2	farraZtuu	'you showed him around'
3.3.3	musta?Zir	'tenant (m.)'
3.3.4	?ist9maar	'colonization'
3.3.5	?ista?balt	'I welcomed'
3.4.1	?almaanya	'Germany'
3.4.3	Zibnaalhum	'we brought (to) them'
3.4.4	dazziinteen	'two dozens'
3.4.5	bitkaatbi\$\$	'she doesn't write to him'
3.5.1	wa??aftha	'I stopped her'
3.5.2	bit9allmuu	'you (pl.) teach him'
3.5.3	?allabthum	'I turned them over'
3.5.4	mitHayyriin	'bewildered (m.pl.)'
3.5.5	bitmar?i\$\$	'she doesn't let him pass'
4.1.1	?aasyawi	'Asian, Asiatic (m.sg.)'
4.1.3	xaaSSatan	'particularly'
4.1.4	baanyohaat	'bathtubs'
4.2.1	Saal-haati	'my friends (f.)'
4.2.3	\$aayfiinak	'we see you (m.sg.)'

4.3.1	?aabliyye	'ability'
4.3.4	Zaam9iyyaat	'university graduates (f.)'
4.4.1	SaaHbaatna	'our friends (f.)'
4.4.3	Zaam9aatkum	'your (pl.) universities'
4.5.1	?aabliyyto	'his ability'
4.5.3	?aabliyytak	'your (m.sg.) ability'
5.1.1	wilbraka	'crankshaft'
5.1.4	haydroZiin	'hydrogen'
5.2.1	Hammluuli	'load (sth.) for me'
5.2.3	wass9uuhum	'widen them'
5.3.1	mist9idde	'prepared (f.sg.)'
5.3.4	mistwiyyaat	'ripe (f.pl.)'
5.4.1	?ustraalya	'Australia'
5.4.3	wazznuulhum	'weigh for them!'

Quadrissyllabic patterns

1.1.1.3	rumatizim	'rheumatism'
1.1.1.4	vitaminaat	'vitamins'
1.1.1.5	marahuli\$\$	'they didn't go to him'
1.1.2.1	Tarabeeza	'table'
1.1.2.3	biZamaatak	'your (m.sg.) pajamas'
1.1.2.4	?abaZooraat	'blinds'
1.1.3.1	Hanafiiye	'faucet'
1.1.3.3	?alaminjom	'aluminum'
1.1.3.4	telivizyon	'television'
1.1.3.5	makatapti\$\$	'I didn't write it (m.)'
1.1.4.1	banTaanya	'Britain'
1.1.4.3	bawaridhum	'their guns'
1.1.4.4	marahuulhaa\$	'they didn't go to her'
1.1.5.1	naDariyyto	'his theory'
1.1.5.3	dakatirhum	'their doctors'
1.1.5.4	maDarapthaa\$	'I didn't hit her'
1.1.5.5	makataphum\$	'I didn't write them'
1.2.1.1	Zazaa?iri	'Algerian'
1.2.1.3	bi\$awin\$	'he doesn't consult'
1.2.1.4	muraasalaat	'correspondence'
1.2.1.5	maraasali\$\$	'he didn't write to him'
1.2.3.1	bi\$aawirha	'he consults her'
1.2.3.3	bi?aabilhum	'he meets them'
1.2.3.4	bi\$aawirhaa\$	'he doesn't consult her'
1.2.3.5	bikaatibhum\$	'he doesn't write to them'
1.2.5.4	maHaarapthaa\$	'I didn't fight her'
1.2.5.5	ma?aabalthum\$	'I didn't meet them'
1.3.1.1	mufakkara	'agenda'
1.3.1.3	mawiSlati\$	'she hasn't arrived'
1.3.1.4	darabzinaat	'banisters'
1.3.1.5	maDarbati\$\$	'she didn't hit him'
1.3.2.1	dimuqraaTi	'democrat (m.)'
1.3.2.3	bukutbuulak	'they write to you (m.sg.)'
1.3.3.1	dima\$qiyye	'Damascene (f.sg.)'
1.3.3.3	sa?alkilhum	'I asked for them'
1.3.3.4	holandiyiin	'Dutchmen'
1.3.3.5	makatbatlak\$	'she didn't write to you (m.sg.)'

1.3.4.1	dizinTaarya	'dysentery'
1.3.4.3	mabikaatbi\$	'he doesn't write letters'
1.3.4.4	busub8uulhaa\$	'they don't dye to/for her'
1.3.4.5	mabit?aabli\$\$	'she doesn't meet him'
1.3.5.4	ma9allamthaa\$	'I didn't teach her'
1.3.5.5	makallamthum\$	'I didn't talk to them'
1.4.1.3	bi\$aaawruki\$	'they don't consult you (m.sg.)'
1.4.1.4	bi9aatbuhaa\$	'they don't blame her'
1.4.1.5	bikaatbuhum\$	'they don't write to them'
1.4.2.1	?araaybiino	'his relatives'
1.4.2.3	?araaybiinak	'your (f.sg.) kin/relatives'
1.4.3.1	?uroobbiyye	'European (f.)'
1.4.3.4	?uroobbiyyaat	'Europeans (f.)'
1.4.4.1	?araaybiinha	'her kin/relatives'
1.4.4.3	?araaybiinhum	'their kin/relatives'
1.4.4.4	bi-Haarbuulhaa\$	'they don't fight for her'
1.4.4.5	bi-Haarbuulkum\$	'they don't fight for you (pl.)'
1.5.1.4	?akoordyonaat	'accordions'
1.5.2.1	?iilkrooni	'electronic'
1.5.2.3	bikattbuuhum	'they make them write'
1.5.3.1	bi9allmi\$Si	'he doesn't teach him'
1.5.3.3	makalthummi\$	'I didn't eat them'
2.1.1.1	?aaxirihi	'in"?ila ?aaxirihi 'etc.'''
2.1.1.3	saaba?atak	'she raced you (m.sg.)'
2.1.2.1	raafa?uuni	'they accompanied me'
2.1.2.3	Haarabuukum	'they fought you (pl.)'
2.1.3.1	?aadamiyye	'human being (f.)'
2.1.3.3	raafa?athum	'she accompanied them'
2.1.3.4	keelomitraat	'kilometers'
2.1.4.1	\$aawaruulha	'they consulted for her'
2.1.4.3	Taalabuulkum	'they demanded for you (m.pl.)'
2.2.3.1	miizaaniyye	'budget'
2.2.3.4	kiimaawiyiini	'chemists'
3.1.1.1	muttaHida	'united'
3.1.1.3	kattabatak	'she made you (m.sg.) write'
3.1.1.4	maTrabanaat	'jars'
3.1.2.1	?istimaara	'application form'
3.1.2.3	?istafaadat	'she benefited'
3.1.2.4	?istimaaraat	'application forms'
3.1.3.1	madfa9iyye	'artillery'
3.1.3.3	waffarathum	'she saved them'
3.1.3.4	ma8ribiyyaat	'Moroccans (f.)'
3.1.3.5	bitjibilhum\$	'she doesn't bring to them'
3.1.4.1	?i9tiraafha	'her confession'
3.1.4.3	?i9tiraadHum	'their objection'
3.1.5.1	?imkaniyyto	'his ability'
3.1.5.3	?imkaniyytak	'your (m.sg.) ability'
3.2.1.1	limlaakame	'the boxing fight'
3.2.1.3	bit\$aawin\$	'she doesn't consult'
3.2.3.1	lubnaaniyye	'Lebanese (f.sg.)'
3.2.3.4	lubnaaniyyiin	'Lebanese (m.pl.)'
3.3.1.1	musta9mara	'colony'
3.3.1.3	baTbuxlaki\$	'I don't cook for you (m.sg.)'
3.3.1.4	musta\$fayaat	'hospitals'

3.3.1.5	?il?ur3uduks	'the Orthodox'
3.3.2.1	?istibdaadi	'autocratic'
3.3.2.3	9allamtiikum	'you (f.sg.) taught them'
3.3.2.4	?isti3naa?aat	'exceptions'
3.3.3.1	kahrabjiyye	'electricians'
3.3.3.3	wa??aftillak	'I stopped for you (m.sg.)'
3.3.3.4	?il?arZantiin	'Argentina'
3.3.3.5	bitkattibhum\$	'she doesn't make them write'
3.3.4.1	wa??aftiilha	'you (f.sg.) stood up for her'
3.3.4.3	wa??aftiilhum	'you (f.sg.) stood up for them'
3.4.1.4	bitraaslunii\$	'you (pl.) don't write to me'
3.4.1.5	bitraasluhum\$	'you (pl.) don't write to them'
3.4.2.1	bit9aaynuuha	'you (pl.) examine it (f.)'
3.4.2.3	bitwaa9duuhum	'you (pl.) promise them'
3.4.4.1	bitraasluulha	'you (pl.) correspond for her'
3.4.4.3	bitHaarbuulhum	'you (pl.) fight for them'
3.4.4.4	bitraasluulhaa\$.	'you (pl.) don't correspond for her'
3.4.4.5	bitHaarbuulhum\$	'you (pl.) don't fight for them'
3.5.1.4	matrakkbuhaa\$	'don't give her a ride'
3.5.2.1	?irra?smaali	'the capitalistic'
3.5.2.3	bit9allmuuhum	'you (pl.) teach them'
3.5.3.1	binkattbi\$\$i	'we don't make him write'
3.5.4.1	bit?ammnuulha	'you (pl.) trust her'
3.5.4.3	bit?a\$\$ruulhum	'you (pl.) wave for them'
3.5.4.4	mat9allmuulhaa\$	'don't teach for her'
3.5.4.5	mat(allmuulhum\$	'don't teach for them'
4.1.3.1	?aasyawiyye	'Asian (f.)'
4.1.3.4	?aasyawiyyaat	'Asians (f.)'
4.3.3.1	?aabliyyitha	'her ability'
4.3.3.3	?aabliyyithum	'their ability'
5.1.1.4	wilbrakayaat	'crankshafts'
5.1.3.1	?arb9iniyye	'centipede'
5.1.3.4	?ingliziyyaat	'English women'
5.2.3.1	ra?smaaliyye	'capitalism'
5.2.3.4	ra?smaaliyyiin	'capitalists'

Pentasyllabic patterns

1.1.1.1.3	marahulaki\$	'they didn't go to/for you (m.sg.)'
1.1.1.1.4	kankateraata	'caricatures'
1.1.1.1.5	makatabuhum\$	'they didn't write them'
1.1.1.2.1	?otomatiiki	'automatic'
1.1.1.3.1	bariTaniyye	'British (f.)'
1.1.1.3.4	bariTaniyyiin	'British (m.pl.)'
1.1.1.4.4	makatabuulhaa\$	'they didn't write to her'
1.1.1.4.5	makatabuulhum\$	'they didn't write to them'
1.1.2.3.1	fidiraaliyye	'federal (f.)'
1.1.2.3.4	fidiraaliyyiin	'federal (pl.)'
1.1.2.3.5	mabikaatibhum\$	'he doesn't write to them'
1.1.3.1.3	maTalablaki\$	'he didn't order for you (m.sg.)'
1.1.3.1.4	tilivizyonaat	'television sets'
1.1.3.1.5	masa?alnali\$\$	'we didn't ask for him'
1.1.3.2.1	baladiyyaati	'coming from my town'
1.1.3.2.3	baladiyyaatak	'coming from your (m.sg.) town'

1.1.3.3.1	danimarkiyye	'Dane, Danish (f.sg.)'
1.1.3.3.3	baladiyyitkum	'your (pl.) municipality'
1.1.3.3.4	danimarkiyyiin	'Danes, Danish (m.pl.)'
1.1.3.3.5	makatabtilli\$\$	'I didn't write to/for him'
1.1.3.4.1	baladiyyaatna	'our municipalities'
1.1.3.4.3	baladiyyaatkum	'your (pl.) municipalities'
1.1.3.4.4	masa?alnaalhaa\$	'we didn't ask for her'
1.1.3.4.5	makatabnaalkum\$	'we didn't write to/for you (pl.)'
1.1.4.1.3	mabiraaslaki\$	'he doesn't correspond with you (m.sg.)'
1.1.4.2.1	Ziyofliizyaa?i	'geophysical'
1.1.4.3.3	marahuulhummi\$	'they didn't go to them'
1.1.4.4.4	mabiHaarbuulhaa\$	'they don't fight for her'
1.1.4.4.5	mabiHaarbuulkum\$	'they don't fight for you (pl.)'
1.1.5.1.4	mabikattbuhaa\$	'they don't make her write'
1.1.5.1.5	mabikattbuhum\$	'they don't make them write'
1.1.5.3.3	maDaraphummi\$	'I didn't hit them'
1.2.1.1.3	muraaslati\$	'she didn't correspond'
1.2.1.1.4	maHaarabuhaa\$	'they didn't fight her'
1.2.1.1.5	makaatabuhum\$	'they didn't write to them'
1.2.1.2.1	muraasilaato	'his correspondence (f.)'
1.2.1.3.1	bi\$awirilha	'he waves to her'
1.2.1.3.3	biHaaribilhum	'he fights for them'
1.2.1.3.4	Zazaa?iriyyaat	'Algerians (f.)'
1.2.1.3.5	maHaarabatli\$\$	'she didn't fight for him'
1.2.1.4.1	muraasalaatha	'her correspondence'
1.2.1.4.3	muraasilaathum	'their correspondence (f.)'
1.2.3.2.1	Salaah-iiyyaato	'his authorities'
1.2.3.2.3	Salaah-iiyyaatak	'your (m.sg.) authorities'
1.2.3.3.3	bi\$awirhummi\$	'he doesn't consult them'
1.2.3.4.1	Salaah-iiyyaatha	'her authorities'
1.2.3.4.3	Salaah-iiyyaatkum	'your (pl.) authorities'
1.2.3.4.4	makaatabnaalhaa\$	'we didn't write to her'
1.2.3.4.5	makaatabnaalkum\$	'we didn't write to you (pl.)'
1.2.5.3.3	maHaaraphummi\$	'I didn't fight them'
1.3.1.1.3	makattabati\$	'she didn't dictate'
1.3.1.1.4	makassaratoos\$	'she didn't smash it (m.)'
1.3.1.1.5	ma9allamati\$\$	'she didn't teach him'
1.3.1.2.1	\$ikoslofaaki	'Czechoslovakian'
1.3.1.2.3	mubamiraatak	'your (m.sg.) justifications'
1.3.1.2.4	?arisToTaaliis	'Aristotle'
1.3.1.3.1	bi?amminilha	'he trusts her'
1.3.1.3.3	budursuhummi\$	'they don't study them'
1.3.1.3.4	katidra?iyyaat	'Cathedrals'
1.3.1.3.5	madarrasathum\$	'she didn't teach them'
1.3.1.4.1	\$cikoslofaakya	'Czechoslovakia'
1.3.1.4.3	mubamiraathum	'their justifications'
1.3.2.1.1	biilmwaafa?a	'approvingly'
1.3.3.1.3	maTabxatlaki\$	'she didn't cook for you (m.sg.)'
1.3.3.1.4	ma9allamtuhaa\$	'you (pl.) didn't teach her'
1.3.3.1.5	ma9allamnahum\$	'we didn't teach them'
1.3.3.2.1	?aristuqraaTi	'Aristocrat(ic)'
1.3.3.3.1	madarrasti\$\$i	'I didn't teach him'
1.3.3.3.3	mabuktubhummi\$	'he doesn't write them'
1.3.3.3.4	mawaffartilhaa\$	'I didn't save for her'

1.3.3.3.5	mabitkattibhum\$	'she doesn't make them write'
1.3.3.4.4	mawa??aftililhaa\$	'you (f.sg.) didn't stand for her'
1.3.3.4.5	mawa??afnaalhum\$	'we didn't stand for them'
1.3.4.1.4	mabitraasulunii\$	'you (pl.) don't write to me'
1.3.4.1.5	mabitraasululi\$\$	'you (pl.) don't correspond for him'
1.3.4.3.3	maZibnaalhummi\$	'we didn't bring to them'
1.3.4.4.4	mabitraasululhaa\$	'you (pl.) don't correspond for her'
1.3.4.4.5	mabitraasululhum\$	'you (pl.) don't correspond (for them)'
1.3.5.3.3	ma9allamthummi\$	'I didn't teach them'
1.4.1.1.3	biHaarbulaki\$	'they don't fight for you (m.sg.)'
1.4.1.3.3	bikaatbuhummi\$	'they don't write to them'
1.4.1.3.4	?ameerkaniyyaat	'Americans (f.)'
1.4.4.3.3	biHaarbuulkummi\$	'they don't fight for you (pl.)'
1.5.1.3.1	?ilikroniyye	'electronic (f.)'
1.5.1.3.3	bikattbuhummi\$	'they don't make them write'
1.5.1.3.4	?ilikroniyyaat	'electronics'
2.1.1.3.1	Haarabatilha	'she fought for her'
2.1.1.3.3	Haarabatilhum	'she fought for them'
3.1.1.1.4	karburetoraat	'carburetors'
3.1.1.2.1	?imbaraToora	'empress'
3.1.1.3.1	?i9arabiyye	'the Arab (f.)'
3.1.1.3.3	biHaribilkum	'she fights for you (pl.)'
3.1.1.3.4	bitilivizyoon	'on television'
3.1.1.4.1	baskalitaatha	'her bicycles'
3.1.1.4.3	baskalitaathum	'their bicycles'
3.1.2.3.1	diblumaasiyye	'diplomacy'
3.1.2.3.3	?irtiZaaliyyan	'on the spur of the moment'
3.1.2.3.4	?iqtiSaadiyyiin	'economists'
3.1.2.5.4	?itifaa?iyyteen	'two agreements'
3.1.3.1.1	?ibanafsaZi	'the violet (m.)'
3.1.3.1.3	biHariblaki\$	'she doesn't fight for you (m.sg.)'
3.1.3.2.1	?imkaniyyaato	'his abilities'
3.1.3.2.3	?imkaniyyaatak	'your (m.sg.) abilities'
3.1.3.3.1	?imkaniyyitha	'her ability'
3.1.3.3.3	bi\$awirhummi\$	'she doesn't consult them'
3.1.3.4.1	?imkaniyyaatha	'her abilities'
3.1.3.4.3	?imkaniyyaathum	'their abilities'
3.2.1.3.1	binkaatililha	'we correspond for her'
3.2.1.3.3	binHaaribilhum	'we fight for them'
3.2.1.3.4	binTaalibilhaa\$	'we don't demand for her'
3.2.1.3.5	bi\$awirilhum\$	'she doesn't consult for them'
3.2.3.2.1	binkaatibhaalo	'we correspond her for him'
3.2.3.2.3	binHaaribhaalak	'we fight her for you (m.sg.)'
3.3.1.1.4	?ilbaskalitaat	'the bicycles'
3.3.1.2.1	bitkarkibuuha	'you (pl.) mess it (f.) up'
3.3.1.2.3	bitkarkibuuhum	'you (pl.) mess them up'
3.3.1.3.1	bil?aktariyye	'largely'
3.3.1.3.3	binkattibilhum	'we dictate for them'
3.3.1.3.4	?iZZumhuriyyaat	'the republics'
3.3.1.3.5	bin?amminilhum\$	'we don't trust them'
3.3.1.4.1	ilHallafuulha	'they threaten her'
3.3.1.4.3	bitwajhanulhum	'they flatter them'
3.3.1.4.4	biHallafuulhaa\$	'they don't threaten her'
3.3.1.4.5	bitwajhanulhum\$	'they don't flatter them'

3.3.2.3.1	?istihaakiyye	'consumer-'
3.3.2.3.4	?istibdaadiyyiin	'autocratic (pl.)'
3.3.3.3.3	bit9allimhummi\$	'she doesn't teach them'
3.3.4.3.3	matfar\$uulhummi\$	'don't brush for them'
3.4.1.3.1	?issoovyatiyye	'the Soviet (f.)'
3.4.1.3.3	matraasluhummi\$	'don't write to them'
3.4.1.3.4	?issoovyatiyyiin	'the Soviet (m.pl.)'
3.5.1.3.1	mat9allmulis\$i	'don't teach for him'
3.5.1.3.3	matrakkubhummi\$	'don't give them a ride'
3.5.4.3.3	matjamm9uulhummi\$	'don't collect for them'
5.1.1.2.1	?an3ropolooZi	'anthropologic(al)'
5.1.1.4.1	?an3ropolooZya	'anthropology'

Hexasyllabic patterns

1.1.1.1.1.3	makatabulaki\$	'they didn't write to you (m.sg.)'
1.1.1.1.3.1	?otomatikiyye	'automatic (f.)'
1.1.1.1.3.3	maDarabuhummi\$	'they didn't hit them'
1.1.1.1.3.4	?otomatikiyyiin	'automatic (m.pl.)'
1.1.1.3.3.3	masa?alilhummi\$	'he didn't ask for them'
1.1.1.4.3.3	maTalabuulhummi\$	'they didn't order for them'
1.1.2.3.3.3	mabiraasilhummi\$	'he doesn't correspond with them'
1.1.3.1.1.3	mamasaknalaki\$	'we didn't hold for you (m.sg.)'
1.1.3.1.3.1	Ziyofizya?iyye	'geophysical (f.)'
1.1.3.1.3.3	maDarabtuhummi\$	'you (pl.) didn't hit them'
1.1.3.3.1.3	maTabaxtillaki\$	'I didn't cook for you (m.sg.)'
1.1.3.3.3.3	maHamatililhummi\$	'I didn't carry for them'
1.1.3.4.3.3	maba9atnaalkummi\$	'we didn't send to you (pl.)'
1.1.4.4.3.3	mabilHaarbuulkummi\$	'they don't fight for you (pl.)'
1.2.1.1.2.1	maHaarabulis\$i	'they didn't fight for him'
1.2.1.1.3.3	maraaasaluhummi\$	'they didn't correspond with them'
1.2.1.1.3.4	maHaarabatilhaa\$	'she didn't fight for her'
1.2.1.1.3.5	maHaarabatilhum\$	'she didn't fight for them'
1.2.1.3.1.3	masaaba?atlaki\$	'she didn't race for you (m.sg.)'
1.2.1.3.3.1	mabaarakatlis\$i	'she didn't bless for him'
1.2.1.3.3.3	biraasililhummi\$	'he doesn't correspond for them'
1.2.3.4.3.3	makaatabnaalhummi\$	'we didn't write for them'
1.3.1.1.3.3	ma9allamuhummi\$	'they didn't teach them'
1.3.1.1.3.4	madarrasatilhaa\$	'she didn't teach for her'
1.3.1.1.3.5	matassaratilhum\$	'she didn't explain to them'
1.3.1.2.3.1	\$ikosluvaakiyye	'Czechoslovakian (f.)'
1.3.1.2.3.4	\$ikosluvaakiyyiin	'Czechoslovakians (m.)'
1.3.1.3.1.3	mabitsabi?laki\$	'she doesn't race for you (m.sg.)'
1.3.1.3.3.3	maHamlatililhummi\$	'she didn't carry for them'
1.3.2.1.3.4	mabitHaaribilhaa\$	'she doesn't fight for her'
1.3.2.1.3.5	mabitHaaribilhum\$	'she doesn't fight for them'
1.3.3.1.3.1	makassamalis\$i	'we didn't break for him'
1.3.3.1.3.3	maHa??a?nahummi\$	'we didn't achieve them'
1.3.3.1.3.4	mabinkarkibilhaa\$	'we don't mess up for her'
1.3.3.1.3.5	mabin8arbililhum\$	'we don't sift for them'
1.3.3.1.4.4	mabitkarkibuulhaa\$	'you (pl.) don't mess up for her'
1.3.3.1.4.5	mabit8arbiluulhum\$	'you (pl.) don't sift for them'
1.3.3.2.3.1	?aristoqraaTiyye	'aristocracy'
1.3.3.2.3.4	?aristoqraaTriyyiin	'aristocrats (m.)'

1.3.3.3.3.3	mabit9allimhummi\$	'she doesn't teach them'
1.3.4.1.3.3	mabitraasilhummi\$	'she doesn't correspond with them'
1.3.4.4.3.3	mabitraasluulhummi\$	'you (pl.) don't correspond for them'
3.1.1.2.3.1	?imbaraTooriyye	'empire'
3.1.1.2.3.4	?imbaraTooriyyaat	'empires'
3.1.1.3.3.3	bitHaribilkummi\$	'she doesn't fight for you (pl.)'
3.1.3.1.3.1	?ilbanafsaZiyye	'the violet (f.)'
3.1.3.1.3.3	bitkarikbuhummi\$	'you (pl.) don't mess them up'
3.1.3.1.3.4	?ilbanafsaZiyyaat	'the violets (f.pl.)'
3.3.1.2.3.1	?il?i\$iraakiyye	'the socialist/socialism'
3.3.1.2.3.4	?il?i\$iraakiyyiin	'the socialists'
3.3.1.3.3.3	matwaSSiiilhummi\$	'don't send to them'
3.3.1.4.3.3	matkarkibuulhummi\$	'don't mess up for them'
3.3.3.1.2.1	?il?iskandaroon	'Alexandretta'
3.3.3.1.3.1	?ilmustanSiriyya	'Mustansiria'
5.1.1.2.3.1	?an3ropolooZiyye	'anthropological'
5.1.1.2.3.4	?an3ropolooZiyyiin	'anthropologists'

Septasyllabic patterns

1.2.1.1.3.3.3	maHaarabatilkummi\$	'she didn't fight for you (pl.)'
1.3.1.1.3.3.3	mabitHaribilkummi\$	'she doesn't fight for you (pl.)'
1.3.3.1.3.3.3	mabinkarkibilhummi\$	'we don't mess up for them'
1.3.3.1.4.3.3	mabitkarkibuulhummi\$	'you (pl.) don't mess up for them'
3.1.1.1.1.3.1	?il?otomatikiyye	'the automatic (f.)'
3.1.1.3.1.3.1	?ilZiyofizya?iyye	'the geophysical (f.)'
3.1.3.1.2.3.1	?i\$ekoslovaakiyye	'the Czechoslovakian (f.)'
3.1.3.1.2.3.4	?i\$ekoslovaakiyyiin	'the Czechoslovakians (m.)'
3.1.3.3.2.3.1	?il?aristoqraaTiyye	'the aristocracy'
3.1.3.3.2.3.4	?il?aristoqraaTiyyiin	'the aristocrats (m.)'
3.3.1.1.2.3.1	?il?imbaraTooriyye	'the empire'
3.3.1.1.2.3.4	?il?imbaraTooriyyaat	'the empires'
3.5.1.1.2.3.1	?il?an3ropolooZiyye	'the anthropological'
3.5.1.1.2.3.4	?il?an3ropolooZiyyiin	'the anthropologists'

ON THE NOTION OF 'SECOND POSITION' IN GREEK

Richard Cervin

The notion 'second position' plays an important role in the syntax of many languages. Depending on the language, the position may be occupied by various elements, such as AUX, pronominal clitics, adverbial particles, modals. It has been generally argued that 'sentential second position' is a syntactic phenomenon. More recently, Radanović-Kocić (1988) has argued that 'second position' is a phonological phenomenon in Serbo-Croatian. In this paper I argue that in Ancient Greek, second position cannot be exhaustively defined either by the syntax or the phonology but requires consideration of pragmatic factors.

0. Introduction¹

Many languages exhibit clitics of one sort or another and it is not uncommon for such clitics to be placed in what is termed the 'second position' of the clause or sentence. But what exactly is 'second position'? 'Second position' (or 2P) may be defined in various ways: After anything which is fronted (Hock 1985), after the first word and/or the first constituent of the sentence (Steele 1975, 1976; Klavans 1982, 1985; Kaisse 1985), after the first syllable (Tegey 1977), after the first phonological phrase (Radanović-Kocić 1988).

The purpose of this paper is to examine the notion of 'second position' with respect to Ancient Greek, a language which may place its 2P particles after the first word, or after the first constituent of the clause, or after non-initial elements within the first constituent. I will argue that 2P in Greek is sensitive not merely to syntax, but also to pragmatic factors.

The first section will provide relevant background material specific to Ancient Greek, such as which elements occupy 'second position', how clitics are characterized in Greek, and how 2P is defined. Section 2 will discuss the two major approaches to the definition of second position, the syntactic and the phonological ones, and how neither of these is sufficient for Greek. In section 3, I will argue for a pragmatic approach to 2P in Greek.

1. General background and definitions.

This paper is not about clitics per se, yet any discussion of 'second position' requires a discussion of clitics, especially in the light of such

statements as Kaisse's: 'All languages with S' clitics place those clitics in second position.' (1985:81, emphasis mine). Now, traditional Greek grammars make a distinction between 'enclitics', words which attach to the preceding word and affect the accentuation of their host, and 'postpositives', words which may never begin a sentence or phrase. (Smyth 1920; Goodwin 1894; Denniston 1954.) Such a distinction is necessary, since not all clitics are 'postpositive', nor is every 'postpositive' word a clitic. Failure to understand this distinction has resulted in erroneous analyses and claims.

1.1. 'Postpositives'. 'Postpositive', as the term is used by the Greek grammars, simply means a word that may never begin a sentence or a clause. The term is non-committal regarding the actual positioning of the word in the sentence. All of the postpositives in Greek belong to a class of words traditionally called 'particles'. These particles are various types of conjunctions and sentence adverbs with a variety of uses: inferential, adversative, correlative, ironic, etc. (For a list of these, together with their functions and meanings, see the Appendix.) These postpositive particles seem to fall into Zwicky's (1977) category of 'bound words', inasmuch as they must have some host to their left. Most of these postpositive particles are always accented, and as such cannot be considered clitics.²

Following are a few illustrative sentences which contain one or more of these postpositive particles.

- (1) a. en Élidi mèn gâr kai en Boiōtoís...
 in Elis - for and among Boeotians...
 (PI Sym. 182b).
 'For in Elis and among the Boeotians...'
- b. ei ára ho Erōs tōn kalōn
 if consequently the-N Eros-N the-G beauty-G
 endeés esti...(ibid. 201c).
 lacking-N is-3s...
 'Consequently, if Eros lacks beauty...'
- c. logisámēnoi dē sunnoēsomen tò páthos...
 thinking- N indeed understand-subj-1p the-A experience-A
 (PI Polit. 270b).
 'Indeed, thinking (thus), we would understand the experience...'

1.2. Clitics. Clitics are generally conceded to be morphemes which are intermediate between words and affixes, i.e., they act like words in some respects, yet like affixes in others. It is also generally agreed that clitics are stressless morphemes which attach to a 'host' word, although there is some discussion of clitics bearing stress (Zwicky 1977; Klavans 1982; Kaisse 1985).

1.2.1. Proclitics. There is some debate in the Greek grammatical tradition regarding which words are proclitic. While the Ancient Greek grammarians did not recognize such a category (Chandler 1881:263-83), modern Greek scholars admit a small class of proclitics, about a dozen words

which are all unaccented monosyllables (Smyth 1920:41; Goodwin 1894:31). Modern linguists, however, such as Sommerstein (1973) and Klavans (1982) treat all prepositions, articles, and certain other words as proclitic.

Regardless of their status as proclitics or not, all prepositions and all forms of the article may serve as host for clitics, and may thus, in effect, occupy 'first position' as in the following examples.

- (2) a. ho **dè** Kûros idōn autōn ... (Xen Cyr. III.1.8)
 the-N and Cyrus-N seeing-N him-A ...
 'And Cyrus, seeing him...'
 b. têi **dè** husteraiāi... (ibid. III.3.34).
 the-D and next-D...
 'And on the next (day)...'
 c. en **dè** tōi toû leimōnos télei... (A.T. I.I.6).
 at and the-D the-G meadow-G end-D...
 'And at the end of the meadow...'

1.2.2. Enclitics. For the purposes of this paper, I shall define enclitics in a rather tight fashion following the traditional Greek definition. Accordingly, enclitics are those words which attach to the right end of a host word, and affect the accent of their host. For example,

- (3) a. ánthrōpós tis (from: ánthrōpós + tis) 'a certain man'
 b. doúlos =te kai eleútheros (from: doúlos + te) 'both a slave and a freeman'
 c. môros =ge =esti (from: môros + ge + esti) 'he's a fool'

Thus, a crucial factor in determining whether a word is enclitic or not is this property of affecting the accentuation of the host word (see Smyth 1920:42-3 and Chandler 1881:263-7). This is important, at least for Greek, because in some modern work on clitics (e.g. Kaisse 1985; Klavans 1982; Sommerstein 1973), certain Greek particles are considered to be clitic, such as *oûn* 'therefore', *gâr* 'for', *dè* 'indeed', although these words do not affect accentuation. Moreover, as noted, these particles are always accented. According to Greek tradition, both ancient and modern, such particles are not enclitics, even though they are postpositives.

The unaccented postpositives (see the appendix), are all enclitic inasmuch as they affect an accentual change on the host. Greek possesses other enclitics besides these postpositive particles, such as the indefinite pronoun *tis* 'anyone', certain temporal particles such as *pote* 'at one time', various enclitic pronouns, and a couple of enclitic verbs.

1.2.3. Pronominal clitics. Pronominal clitics in Greek, both as grammatical subject and object, need not occur in 2P. Kaisse (1985:80) gives an example of an object clitic, *nin*, in 2P along with what she calls an S'-clitic, *dè*. Her citation is given as (4) below:

- (4) *egō =de =nin hōs enoēsa.*
 I =but =him so perceived.
 'But I perceived him thus.' (Theoc [Idyll 2.103]).

A few pages later she states, 'A glance at the Tagalog examples or the Ancient Greek...reveals that these languages also place their object...clitics in second position.' (1985:83) This statement is misleading for Greek because object clitics need not appear in 2P. Wackernagel (1892) demonstrated a **tendency** for pronominal enclitics to occur in 2P, but that tendency has percentage rates of only 40-65% as far as I can see.³ It is, however, by no means obligatory for pronominal enclitics to appear in 2P. As the following examples show, pronominal enclitics may occur at any point within a given sentence, except initially.

- (5) a. *thermōs gār érōs autō =me kataíthei.* (Theoc 7.56).
 hot-N for love-N here me-A burns-3s.
 'For hot love burns me here.'
- b. *phoiteís d' aúth' houtōs hókka glukūs húpnos*
 wander-2s but again thus whenever sweet-N sleep-N
ékhei =me. (Theoc 11.22).
 take-subj-3s me-A
 'But you wander off again whenever sweet sleep takes me.'
- c. *ē dè Puthiē =oi khrâi táde: ...*
 the-N and Puthia-N him-D prophesied-3s thus
 (Hdt I.55.2).
 'And the Pythian (priestess) prophesied to him thus: ...'

Some pronouns have accented full forms which may occur clause initially. In the following example, the pronoun *sè* is clearly clause initial as is shown by the 2P particle *mèn* which follows it. Note that, as in other Indo-European languages, the vocative, *Zeû*, is extra-clausal, i.e., does not count as occupying first position.

- (6) (*Zeû*), *sè mèn Idaíoisin en ouéresi =phāsi*
 Zeus-V, you-A - Idaian in mountains say-3p
genésthai. (Call Hymn 1.6).
 to-be-born.
 'Zeus, they say you were born in the Idaian mountains.'

1.2.4. Clitic verbs. Greek also has a couple of clitic verbs. These verbs are peculiar in that they are enclitic only in the first and third person of the present tense. The verbs in question are *eimí* 'to be' and *phēmi* 'to say, affirm'. They can be identified as clitics by their property of affecting the accentuation of their host. However, they are not limited to 2P. For example:

- (7) a. *oudeís gār outō anóētós =esti.* (Hdt I.87.4)
 no-one-N for so stupid-N is-3s.
 'For no one is so stupid.'
 (*anóētós =esti* < *anóētos + esti*)

- b. Perséōn mén nun oi lógiōi Phoínikas
 Persians-G - now the-N historians-N Phoenicians-A
 aítious =phāsì genésthai tês diaphorês.
 causes-A say-3p to-be the-G quarrel-G.
 (Hdt I.1.1).
 'Now the Persians' historians say (that) the Phoenicians are the
 cause of the quarrel.'
 (aitious =phāsì < aítious + phāsì)

The clitic forms of *eimí* and *phēmí* need not occur in 2P, although they frequently do so. *estí* 'is-3s' also has an accented full form which is usually impersonal.

- (8) ésti =moi kálā páis. (Sap 132).
 is-3s me-D beautiful-N daughter-N.
 'There is to me a beautiful daughter.'
 = 'I have a beautiful daughter.'

The verb *phēmí* also has accented full forms:

- (9) phāsì dé =min Delphoi Theodórou tou
 say-3p and it-A Delphians-N Theodorus-G the-G
 Samíou érgon eínai. (Hdt I.51.3).
 Samian-G work-A to-be.
 'And the Delphians say (that) it is the work of Theodorus the Samian.'

It is beyond the scope of this paper to discuss whether these clitic verbs are generated in their surface positions or moved there. My point is to illustrate that Greek clitic verbs can occur in a wide variety of positions.

1.3. Defining 2P for Greek. Second position, in its most general sense, is after the first word of a sentence or clause in Greek. So for example, the 2P conjunction *dè* will occur most often after the first word. (Note that *dè* is frequently elided to *d'* before a vowel).

- (10) a. híppeue dé ho país en agrôi.
 was-riding-horseback and the boy in field
 b. ho dè país en agrôi híppeue.
 c. en d' agrôi híppeuen ho país.
 'And the boy was riding horseback in a field.'

In (10a), the verb *hippeue* is the first word, as well as the first constituent, and *dè* is placed immediately thereafter. In (10b and c) *dè* also occurs after the first word. In so doing, it interrupts the initial constituent, the subject NP in (b) and the PP in (c). The Greek sentences cited thus far may serve as illustrations of this principle.

However, a second principle is at work in Greek, that of placing a 2P particle after the first constituent, not after the first word. Thus, (10b and c) could also be written as

- (10) d. ho païs **d'** en agrôï híppeue.
 e. en agrôï **dè** ho païs híppeue.

Following are a couple of such examples from Greek literature to further illustrate the point:

- (11) a. [PP dià tínos állo] **oûn** éti prosdokâs àn
 by what other so yet expect-2s would
 autà matheîn? (PI Crat. 438e).
 them to-learn?
 'So by what other (way) would you expect to learn these things?'
- b. [PP epì tèn Leukíppēn] **dè** ho stratēgòs...
 at the-A Leucippe-A but the-N general-N...
 (A.T. IV.3.1).
 '... but the general (was looking) at Leucippe.'

Furthermore, the notion of 2P in Greek is not confined to the sentence, but is relevant also to sub-clauses of sentences. For example, a conditional sentence is usually comprised of two clauses, an 'if' clause and a 'then' clause. In Greek, each of these clauses may have its own 2P particle as in the following sentence:

- (12) èn **dè** mē ékhōsi higròn mēdén, oi **dè**
 if - not have-3p wet-A nothing-A, the-N -
 tēs khamáthen spodoû labóntes leikhousi.
 the-G from-ground dust-G taking-N lick-3p.
 (Hdt IV.172.4).
 'If they (a tribe called Nasamones) do not have anything wet (to drink), they lick the dust from the ground.'

Note that a small subset of 2P particles can be employed even in combination with phrases (NPs or PPs), as the following example shows. Here the contrast is between Philip promising 'you' (i.e. the Athenians) 'peace' and promising 'them' (i.e. the Thebans) 'help', and the correlatives which clarify this contrast are in their appropriate second position. Examples of this type suggest that a complete discussion of Greek 2P particles will have to consider not just the level of the sentence or clause. However, to simplify matters I will in the following limit myself to the use of particles in sentential or clausal second position.

- (13) Philippos...[humîn **mèn** eirénēn] [ekeínois **dè**
 Philip-N... you-Dp - peace-A them-Dp but
 boêtheian] epēngeílato. (Dem 18.19).
 help-A promised-3s.
 'Philip...promised you peace and them help.'

1.4. Collocation of 2P particles. It frequently happens that two or more postpositives cooccur in 2P. This sounds like a contradiction in terms:

two different words in a linear sequence, each in 'second' position? That *gār* 'for' is a 2P postpositive can be seen from example (5a) above. Similarly, *dē* 'indeed, in fact' is a 2P postpositive, as illustrated in (1c) above.

What happens if *gār* and *dē* are used together in a sentence? They are stacked up one after the other as *gār dē* (usually not *dē gār*),⁴ and this 'stacked up' collocation as a unit occurs in 2P. (Cf. Hock 1982 for a similar stacking or 'doubling' up of particles in Vedic Sanskrit.) Denniston, commenting on the collocations of postpositive particles, says that conjunctive particles tend to precede adverbial particles (1954:lx).

- (14) *ōs gār dē diexélthoi o kērux ...*
 when for in-fact came-3s the-N herald-N
 (Hdt I.196.3).
 'For when the herald in fact came ...'

Collocations of postpositive particles may in turn be followed by pronominal and other clitics, as the next examples show.

- (15) a. *ōtoi mèn dé =sphi gnōmās toiásde*
 these-N then - them-D opinions-A these-A
 apedéxanto. (Hdt I.171.1).
 proved-3p.
 'Then they proved these opinions to them.'
- b. *patrōión =te gār =toi =esti kai prosēti*
 ancestral-N both for you-D is-3s and besides
 rōmē upárkhei. (Hdt I.41.3).
 strength-N exist-3s.
 'For it is your (toi) ancestral (duty), and besides, you possess strength.'

2. Explanations of second position.

Most of the work on the notion 'second position' assumes that 2P is a syntactic phenomenon with little or no direct reference to phonology (Steele 1976; Klavans 1982, 1985; Kaisse 1985). Radanović-Kocić (1988) however, argues that phonology is very relevant to the notion of 2P. These two different views will be summarized here.

2.1. 2P as a syntactic phenomenon. Steele (1976) describes Luiseño, an Amerindian language, where AUX occupies the second position of the sentence. She calls this 'sentential second position' because the AUX element has 'scope' over the entire sentence, and not just over a part of the sentence. (She never defines the term 'scope'.) 'Second position' in Luiseño is very much like what it is in Greek, i.e., 2P is reckoned either after the first word or after the first constituent of a sentence. To capture this notion of second position for Luiseño, Steele posits two principles (1976:596):

- (16) Principle 1:
 Put the auxiliary after the first word.
 Principle 2:
 Put the auxiliary after the first constituent.

However, as I will demonstrate in section 3, these principles are not enough to account for 2P placement in Greek.

Steele further posits that Luiseño AUX is generated in sentence-initial position and is either moved rightward in accordance with her two principles, or some word/constituent is fronted around the AUX. For Steele, 'sentential second position is very much a surface phenomenon' (604).

Kaisse (1985) also treats 2P as a syntactic phenomenon. For Kaisse, Greek postpositives such as *gâr*, *dê*, and *dê* are 'sentential clitics' (i.e. S' clitics) which 'have scope over the entire sentence' (77). Again, 'scope' is not defined. Such S' clitics are generated in COMP and are somehow moved to their appropriate syntactic position. Kaisse says that she wants 'to remain neutral on the issue of how some or all clitics arrive at their surface position' (76).

Klavans (1982, 1985) has developed a theory of clitics which is designed to 'constrain clitic positioning in a universal framework, regardless of the language-particular origins of clitics' (1985:96). Insofar as some languages, like Greek, have 2P clitics, Klavans's theory is relevant to the notion of second position. Klavans also argues that the syntax and phonology of clitics are independent of each other.

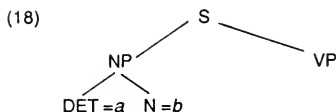
Klavans goes on to discuss her proposal, which involves three parameters, the purpose of which is to define clitics in syntactic terms and to constrain their positioning at S-structure. Her three parameters are as follows (1985:97-8):

- (17) P(arameter) 1: Initial/Final: Refers to the first or last constituent of the sentence which acts as the clitic's host under the clitic's domain.
 P2: Before/After: Refers to the location of the clitic, either before or after its host.
 P3: Proclitic/Enclitic: Refers to the direction of phonological liaison.

Klavans then introduces a notion of Domain of Cliticization which she defines thus (1982:68):

A node N is the Domain of Cliticization for a clitic *c* if the syntactic position of *c* is determined with respect to the immediate constituents of the designated node N.

So, for example, in a structure such as (18), the domain of position *a* is NP, while the domain of position *b* is S. As far as I can tell from Klavans, her notion of Domain is merely syntactic, not semantic or pragmatic.



These parameters, along with Klavans's notion of Domain, predict the possible placements of postpositive particles discussed so far. According to Klavans's theory, the Greek postpositive conjunction *dè* would be categorized as follows:

(19) Parameters of *dè*:

P1 : initial.

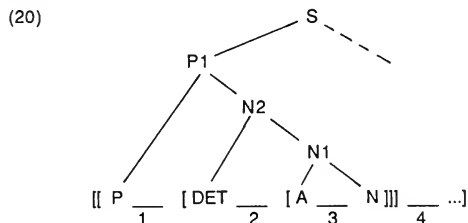
P2 : after its host, i.e. postpositive.

P3 : this parameter is inapplicable, since *dè* is an accented particle and not a clitic.

In the sentences in (10), reproduced below, *dè* occurs after the initial constituent within the domain of S in (a, d, e), but *dè* is within the domain of the NP in (b) and within the domain of the PP in (c).

- (10) a. [hippeue] *dè* ho païs en agrôi.
 b. [ho *dè* païs] en agrôi hippeue.
 c. [en d' agrôi] hippeuen ho païs.
 d. [ho païs] d' en agrôi hippeue.
 e. [en agrôi] *dè* ho païs hippeue.

Klavans's theory, however, does not predict the entire range of possibilities. Take, for example, an S initial PP of the structure in (20):



For this structure, Klavans's theory allows clitics to go only into position 1 (initial/after within the domain of P1), and position 4 (initial/after within the domain of S). Positions 2 and 3 are disallowed by Klavans's theory because they are positions within the sub-structure of the initial constituent, P1. Klavans's Parameter 1, therefore, cannot refer to either N2 or N1, and thus positions 2 and 3 are ruled out.

But the Greek postpositives can occur in all four of these positions as can be seen in the following examples.

- (21) a. (kai) [NP hoi álloi d' Hállēnes] ... (Dem 18.43).
 also the other and Greeks
 'And the other Greeks also ...'
- b. [NP tăn glaukân dè thálassan] éã
 the-A grey-A but sea-A permit-imper-2s
 potì khersòn orekhtheîn. (Theoc 11.43).
 to dry-land to-lap.
 'But permit the grey sea to lap the dry land.'
- c. [PP ek toû autoû mèn khoriou] ē ormē éstai.
 at the same - place the attack shall-be.
 (Hdt I.11.5).
 'The attack shall be at the same place.'
- d. [PP en toutōi dē tōi khronōi] ho
 in this-D indeed the-D time-D the-N
 presbúteros pais... prosēiei ... (Xen Cyr. III.1.7).
 elder-N son-N... came-forth-3s
 'At this time, the elder son...came forth ...'

In (21a and b), the particle occurs in the position under N1 (position 3 in (20)) which is ruled out by Klavans's theory. Note that *kai* in (21a) stands outside the constituent in the same way as the vocative is outside the constituent in example (6) above.⁵ In (21c) the particle stands in position 3 from (20) within the PP, while (21d) shows the particle in position 2. These examples show that 2P in Greek is defined not just in terms of the margins of constituents as Klavans's theory suggests, but may be located anywhere within the first constituent or immediately following it.

For Klavans's theory to work for Greek, it would have to be modified so that 2P postpositives may be placed anywhere within the initial constituent. Moreover, it would have to be permitted to apply both to clitic and to non-clitic particles. It is not clear to me at this point how such modifications could be made without seriously changing the entire framework.

2.2. 2P as a phonological phenomenon. In her thesis on clitics in Serbo-Croatian, Radanović-Kocić (1988) takes a different approach from Steele, Klavans, and Kaisse. Whereas the latter attempt to solve the problem of 2P clitics by exclusively syntactic means, Radanović-Kocić claims that cliticization, in Modern Serbo-Croatian at least, is a post-syntactic phenomenon which is effected in PF. Serbo-Croatian has several categories of clitic elements: auxiliaries, pronominals, a question particle, sentential adverbs, all of which occur in 2P. After surveying the evidence and considering alternative interpretations, Radanović-Kocić comes to the conclusion that 2P must be defined as the position which follows the first phonological phrase (1988:118, 141-3). Accordingly, she posits the following clitic movement rule (134):

(22) Clitic Movement

Move all [+clitic] elements within an I[ntonational] P[hrase] into the position after the first P[honological phrase] of the same I[ntonational] P[hrase].

Radanović-Kocić is probably right in claiming that syntax alone is not enough for cliticization. However, the constraints operative in Serbo-Croatian are not directly applicable to Greek. The only grammatical category which must obligatorily occupy 2P in Greek is the postpositive particles. Such is not the case in Serbo-Croatian. Any complex constituent may be interrupted by the Greek postpositives, but this is not so in Serbo-Croatian. Moreover, there is nothing in the attested evidence of Ancient Greek that requires a phonological, as opposed to a syntactic, solution.

3. A pragmatic account of 2P.

As we have seen, a mere syntactic analysis of second position in Greek runs into difficulties because 2P postpositive particles may occur anywhere within the first constituent, as well as after the first constituent. Klavans's theory predicts only some of the various options for 2P in Greek. Moreover, even if it could be made to work for Greek, it would not address the question of why one option should be employed against another. It is my contention that the various possible syntactic interpretations of 2P in Greek can be motivated by pragmatic concerns such as topicalization, focus, or emphasis.

Steele (1976:608-10) raises the possibility of topicalization/emphasis as related to the 2P auxiliary in Luiseño, but does not go into a lot of details and leaves the matter open for further consideration.

However, in Greek literature, there are many passages where, within the overall discourse context, the placing of a postpositive particle either late in a complex constituent, or after a complex constituent, unambiguously signals that what precedes is emphatic or in focus. To illustrate this claim, I will cite a few examples with extended context.

- (23) ὄφελέν =s' ὁ τυφλὸς Πλούτη μήτε γαῖ
 would-3s you-A o blind-V Pluto-V neither earth-D
 μέτ' ἐν θαλάσσει
 nor in sea-D
 μέτ' ἐν ἠπειρῶι φανέμεν, ἀλλὰ Τάρταρον =te
 nor on mainland-D to-appear, but Tartarus-A both
 ναίειν κ' Ἀχέροντα;
 to-inhabit and Acheron-A;
 [διὰ σὲ] γὰρ πάντ'
 because-of you-A for everything-N
 αἰὲν ἀνθρώποις κακᾶ. (Tim 731).
 always men-D evil-N
 'O blind Pluto, would (that) you not appear on earth or sea or
 mainland, but (may you) inhabit Tartarus and Acheron; for (it is)
your fault (that) everything (is) always evil for mankind.'

In the last sentence of this short poem, *sè* is emphatically accented, and *gàr* follows the entire constituent, *dià sè*. This, plus the overall tenor of the poem, justifies the translation I have given, 'for it is **your** fault ...'

- (24) [kaleī] **dè** pròs tèn théan hēmās ho
 invite-3s then to the-A spectacle-A us-A the-N
 stratēgós, kai hē Leukíppē sumparén.
 general-N, and the-N Leucippe-N was-present-3s.
 [hēmeīs] **mèn oún** epì tò thērion toús ophthalmoùs
 we-N - so at the-A beast-A the-A eyes-A
 eíkhomen, [epì tèn Leukíppēn] **dè** ho stratēgós;
 held-3p, at the-A Leucippe-A but the-N general-N;
 kai euthùs healókei. (A.T. IV.3.1).
 and quickly was-captivated-3s.
 'Then the general invited us to the spectacle, and Leucippe was present. So **we** were looking at the beast, but the general (was looking) **at Leucippe**, and he was quickly captivated.'

In this text, the author manages to convey a double-focus: 'we' is contrasted with 'the general', and 'the beast' with 'Leucippe'. This is effected by means of the rhetorical trick of chiasmus, (the linear sequence of **a b b a**) and the presence of the 2P correlative particles *mèn ...dè*. The chiasmic sequence in (24) is 'we, at the beast... at Leucippe, the general', i.e., subject, PP ... PP, subject. *mèn* and *dè* are employed to reinforce the double-focus/chiasmus, in that *mèn* highlights *hēmeīs* 'we', while *dè* highlights *epì tèn Leukíppēn* 'at Leucippe'. Again, *dè* occurs after the entire constituent, rather than after the first word of the constituent.

- (25) [entaútha] **dè** ho Arménios gignóskōn tèn
 then emph. the-N Armenian-N realizing-N the-A
 anánkēn katabáinei, kai ho Kúros labōn
 necessity-A come-down-3s, and the-N Cyrus-N taking-N
 eis tò méson k'akeínon kai t'álla pánta
 to the middle both-him-A and the-rest-A all-A
 periestratopedeúsato, homoú éđē pásan ékhōn
 pitched-camp-3s, where already all-A having-N
 tèn dúnamin.
 the-A force-A.
 [en toutōi **dè** tōi khrónōi] ho
 in this-D emph. the-D time-D the-N
 presbúteros país toú Armeníou Tigránēs ex
 elder-N son-N the-G Armenian-G Tigranes-N from
 apodēmías =tinòs prosēiei, hòs kai
 journey-G some-G was-coming-3s, who-N also
 súnthērós =pote egegéneto tōi Kúroi.
 fellow-hunter-N once was-3s the-D Cyrus-D.
 (Xen Cyr. III.1.6-7).

'Then the Armenian, realizing the need, came down, and Cyrus took both him and all the rest to the middle of his (Cyrus') camp, where he (Cyrus) already had all his force. At that time, Tigranes, the elder son of the Armenian, who at one time used to be a fellow hunter with Cyrus, was coming from some journey (abroad).'

In this passage, the only postpositive word used is *dē*. The first occurrence of *dē* is after a single word constituent, but the second occurrence is of greater interest, since *dē* occurs in the middle of the constituent, thereby emphasizing *toutōi* 'that'.

Examples like these show that there is a correlation between 2P and the range or 'scope' of focus or emphasis. This is especially clear with constituents consisting of more than two words, where the placement of particles can single out any one of the words as being emphasized or focussed.

The notion of second position in Greek can thus be summed up as follows:

- (26) 1. Regarding single word constituents, 2P is immediately thereafter.
 2. Regarding constituents of more than one word,
 a. the pragmatically neutral position is after the first word;
 b. the pragmatically marked positions are anywhere else within the first constituent, or after the first constituent, such that the particle follows the element under emphasis or focus.

4. Conclusion.

The notion of 'second position' in Ancient Greek is not a mere syntactic phenomenon, but has pragmatic functions as well. Further, the elements which go into 2P are best defined as particles. While some of these are clitics (as Kaisse and Klavans show), others are always accented regardless of their phonological environment, and are presumably not clitics. Moreover, clitic pronouns and verbs in Greek are not restricted to 2P.

Two issues were not addressed because their exploration would have gone beyond the scope of this paper. One is the syntactic origin of the Greek postpositives. There are several possibilities: They could be base-generated in their surface position; they could be generated in COMP and either lowered into the initial constituent, or elements could be fronted around the postpositives to the left; they could be located under a different node altogether; or a combination of the above. The second issue has to do with the interaction of the process of fronting with the placement of postpositives. I hope to address these issues in future publications.

NOTES

¹The following abbreviations have been used throughout this paper: '=' indicates clitic attachment; N - nominative; V - vocative; G - genitive; D - dative; A - accusative; s - singular; p - plural; subj - subjunctive; imper - imperative.

²As Wanner (1978) and Klavans (1982:91-114) have shown, some languages permit clitics to be accented. However, such accentuation is found only in certain phonological contexts. Greek particles like *oûn* are accented no matter what their phonological context.

³Wackernagel (1892:352) cites some statistics which he culled from Book VII of Herodotus's Histories: Of 45 occurrences of *toi* 'you-Ds', 18-20 are in 2P; of 16 occurrences of *se* 'you-As', 10 are in 2P; 24 out of 37 instances of *moi* 'me-Ds', are in 2P; to quote a few. In these few sets of statistics one can see percentage rates of 40 - 65% as far as 2P placement is concerned. I myself tallied the occurrences of the pronoun *min* '3 pers.-A' and *oi* '3 pers.-D' (these pronouns refer to the third person irrespective of gender), throughout Books I and II of Herodotus's Histories, and my findings are as follows: *min* occurs 120 times, of which 69 (57%) are in 2P, and *oi* occurs 175 times with 109 (62%) in 2P.

⁴*dê gâr* is frequent in Homer, but is not found in most prose authors at all. The collocation occurs only three times each in Plato (Polit. 264e1; Parm. 138b8; 140e2) and Plutarch (Moralia 30.E.9; 32.C.11; 380.E.8). None of the following authors/works use the collocation: Aristotle, Demosthenes, Epictetus, Herodotus, Josephus, Lysias, New Testament, Philo, Plotinus, Polybius, Thucydides, Xenophon.

⁵The position of *kai* in a Greek sentence is interesting because it **may** act as a host for clitics, but it need not do so. In the following pair of sentences, the dative pronoun *oi* cliticizes to *kai* in (a) but to the adjective of the direct object in (b):

- (27) a. *kaí =oi egéneto thugatēr ...*(Hdt I.107.1).
and him-D was-3s daughter-N
'And he had a daughter ...'
- b. *kai megístēn =oi ortēn anágousi.*
and greatest-A her-D feast-A celebrate-3p.
(Hdt II.40.1).
'And they (Egyptians) celebrate her (a goddess) with (the)
greatest feast.'

kai may also combine with certain postpositive particles with idiomatic meanings, e.g., *kai gâr* 'for in fact', *kaíper* 'although', *kai mēn* 'and yet' (Smyth 1920:640, 654, 659 respectively).

The Greek *kai* behaves very much like German *und*. Hock (1985:5) points out that *und* is extra-clausal in Standard German, i.e., it is not counted as occupying any position at all in the sentence. This can be seen from the behaviour of the verb which must occupy the second position:

- (28) a. und er **kam** nach hause.
 b. *? und **kam** er nach hause.
 'and he came home.'
 c. dann **kam** er nach hause.
 d. * dann er **kam** nach hause.
 'then he came home.'

(28b) is ungrammatical in Standard German, but it is acceptable in some dialects. The behaviour of *und* is different from other adverbs such as *dann* in that *und* is extra-clausal, whereas *dann* is definitely counted as the first word/constituent of the sentence. (See also Hock 1982 for a similar situation in Vedic Sanskrit, where certain sentence-linking adverbs may be treated by the syntax as either outside of the clause or as first elements of the clause.)

TEXTUAL ABBREVIATIONS

A.T.	Achilles Tatius, Leucippe and Cleitophon (in Gaslee)
Call	Callimachus, Hymns (in Hopkinson)
Dem	Demosthenes, 18: On the Crown (in Butcher)
Hdt	Herodotus' Histories (in Hude)
Pl	Plato (cited from Burnet)
	Crat: Cratylus
	Parm: Parmenides
	Polit: Politicus
	Sym: Symposium
Sap	Sappho, Fragments (in Page)
Theoc	Theocritus, Poems (in Gow)
Tim	Timocreon, Fragments (in Page)
Xen	Xenophon, Cyropaideia (in Gemoll)

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APPENDIX

Following are the postpositive particles which Smyth lists in his grammar (1920:631-671). I have organized this list in terms of accented and unaccented particles. The unaccented particles are all enclitic.

ACCENTED PARTICLES

ára	inferential	'consequently, therefore'
âra	confirmatory	'indeed, in fact'
aû	adversative	'on the other hand'
gàr	confirmatory	'in fact, indeed'
	causal conjunction	'for, because'
dè	conjunction	'and, but, yet'
dè	emphatic	'indeed, in fact'
mèn	emphatic	'indeed, in truth'
mèn...dè	correlative sequence	
	indicating contrast	
mèn	asseverative	'in truth, surely'
	adversative	'however'
	confirmatory	'in fact, indeed'
oûn	inferential	'therefore, accordingly'
	temporal conjunction	'then'

UNACCENTED PARTICLES

ar/ra	reduced enclitic form of ára above	
ge	emphatic	'certainly, at any rate'
nun/nu	temporal	'now, at the present'
per	emphatic	'very, just, even'
te	conjunction	'and, both'
toi	confirmatory	'in truth, doubtless'

UNICORN: A unification parser
for attribute-value grammars*

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UNICORN is a unification-based natural language system that is modelled after the family of PATR systems. This paper describes the functionality of the system from the user's perspective and provides details of its design and implementation in PROLOG.

1. Introduction

This paper describes the functionality and implementation of UNICORN, a unification-based natural language processing system which is modelled after the family of PATR systems described in Shieber et al. (1983) and Karttunen (1986).¹ The system described in this paper is fully implemented in TI-Prolog™ on Texas Instruments Explorer™ workstations used by the Computational Linguistics Laboratory at the University of Illinois.

The development of UNICORN has been guided by three main considerations: (1.) We would like to make available to linguists and workers in related fields a set of computational tools that enable them to explore the expressiveness of complex-feature based grammar formalisms without presupposing any knowledge of the algorithms used to embed such grammars into natural language processing systems, (2.) we would like to make available to instructors and students in computational linguistics a set of instructional tools that contribute to study the algorithms that underlie unification-based natural language processing systems, and (3.) we would like to explore further extensions to known algorithms for unification-based systems that make it possible to employ such systems in a wide variety of areas in computational linguistics (including in particular natural language generation, machine translation, and semantic interpretation).

The structure of this paper reflects the three goals driving the development of UNICORN. Section 2 contains a discussion of the system for those users that are primarily interested in using UNICORN as a computational workbench, without becoming involved in the details of its underlying algorithms. It also

provides relevant discussion for those users that want to view the system primarily as an instructional tool. Section 3 contains a detailed discussion of the algorithms underlying the UNICORN system and their Prolog implementation. The paper has two appendices: Appendix A contains a sample grammar for a fragment of English that illustrates the grammar formalism employed in the UNICORN system. Appendix B provides a listing of relevant parts of the Prolog implementation of UNICORN. This appendix includes a listing of the unification package for directed acyclic graph structures, of the routine for checking subsumption among DAG structures, and of the procedure `path_value` that identifies the value for some path in a DAG. Appendix B also contains a listing of our Prolog implementation of the algorithm for restricting DAG structures in the context of the generalized version of Earley's algorithm presented in Shieber (1985). The rationale for including a partial listing of the UNICORN system derives from the practice suggested by Hobbs and Shieber (1987), namely to make available in print one's own solutions to research problems in the field, for which algorithms and implementations are known to exist, but which, for one reason or another, tend to remain inaccessible to many researchers in the field.

2. A User's Guide of UNICORN

UNICORN consists of three main components: (1.) a unification package for unifying directed acyclic graph structures (DAG structures), (2.) a parsing component that uses a generalized version of Earley's algorithm presented by Shieber (1985), and (3.) a grammar interpreter that converts input grammars submitted by the user into directed acyclic graph structures (DAG structures) that are employed by the parser. As illustrated in figure 1, the modular structure of the UNICORN system derives from its three main components, with the DAG unifier serving both the grammar interpreter and the parsing component.

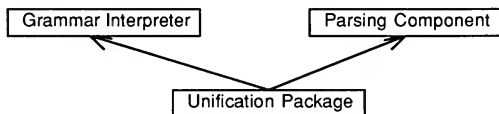
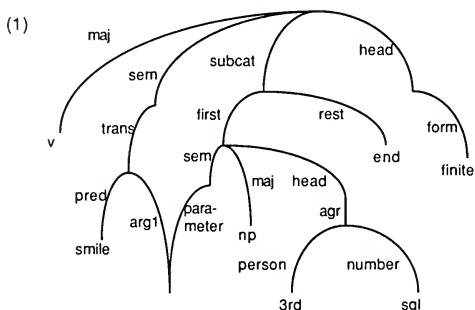


Figure 1: The Architecture of the UNICORN system

In the parsing component, the DAG unification package operates on complex non-terminal symbols in order to unify them with other DAG structures. In the grammar interpreter the DAG unifier operates on partially interpreted grammar rules which themselves are represented as DAG structures in order to increment the information encoded by such rules.

2.1. The Representation of Directed Acyclic Graphs (DAG's).

The most important data structure used in the UNICORN system is that of a directed acyclic graph (DAG). Such structures have been employed in name and/or spirit by a wide variety of grammar formalisms, including Functional Unification Grammar, Lexical Functional Grammar, PATR grammars, and Head-Driven Phrase Structure Grammars. An example of a DAG structure to encode grammatical information is given in (1).



The DAG in (1) describes the grammatical information associated with the lexical item *smiles* in the example grammar given in Appendix A of this paper. The DAG specifies four main features: maj, head, subcat, and trans. The values for the maj and head features (familiar from GPSG and HPSG grammars) specify which major syntactic category the verb *smile* belongs to and which features will be inherited by its mother category. The maj and head features are specified in such a way that *smile* is characterized as a finite verb. The subcat feature specifies that *smile* subcategorizes for a category whose head feature is marked as third person singular. The feature trans contains information about the semantics associated with *smile*. It specifies that the translation consists of a predicate whose value is *smile* and whose argument is the same as the basic translation associated with the translation of the category that *smile* subcategorizes for.

Alternatively, DAG structures can be represented by attribute-value matrices as in (2), in which reentrant values are marked by shared numerical values.


```

(4) FS:      [[[x0, [[maj, s],
                    [head, _115],
                    [sem, [trans, _127]],
                    [gap, _133]]],
              [x1, _139],
              [x2, [[maj, vp],
                    [head, _115],
                    [sem, [trans, _169]],
                    [gap, _133]
                    [subcat, [[first, _139]
                               [rest, end]]]]]],

R_List: [[_139, [[maj, np],
                [sem, [trans, _127]],
                [fun_arg, [trans, _169]]]],
         [_115, [form, finite]]
         [_133, []]
         [_169, []]
         [_127, []]]

```

The feature structure in (4) represents the feature structures associated with the three categories S, NP, and VP in the S → NP VP rule of the sample grammar given in Appendix A. In that grammar, head features are taken to be inherited by the mother category from their head daughter, and the value for head in the feature structure for S has to be reentrant with the value for head in the feature structure for VP. Moreover, since the VP of S is taken to be finite and since finite is the value of a head feature: form, [form, finite] has to appear among the values for the reentrant value of the paths <x0 head> and <x1 head>. Notice also that the feature structure for NP, the leftmost daughter of S, is taken to be reentrant with the first element on the subcategorization list of the verb phrase.² Hence, [cat np] has to be among the values on the reentrancy list for the reentrant value _139. The list of values associated with the variable _139 exemplifies a further property of reentrant values, namely that reentrant values can be reentrant themselves. For example, the reentrant value _139 has among its values a FS whose values for <sem trans> and <fun_arg trans> are reentrant appropriate values in the feature structures for the categories S and VP, respectively.

One condition that we have not imposed is that our DAGs have to be acyclic. Thus, it is easy to represent e.g. a category that subcategorizes for itself: [[[x0 P]], [P, [[subcat, P]]]]. While technically such structures are directed graphs rather than DAGs we have continued to use the term DAG mainly because we have not yet found any use for cyclic structures for representing linguistic information. Still these cyclic structures are handled by the DAG unifier embedded in UNICORN without modification. Thus, if it turns out that

there is linguistic motivation for employing cyclic structures, UNICORN will be able to accommodate such structures.

2.2. The DAG Unification Package

The DAG unifier embedded in UNICORN has as its top-level predicate a three-place relation `d_union(Dag_1,Dag_2,Dag_3)` which holds just in case `Dag_3` is the most general DAG structure which is subsumed by both `Dag_1` and `Dag_2`, i.e. just in case `Dag_3` is the unification of `Dag_1` and `Dag_2`. (For a detailed discussion of the subsumption ordering among DAG's see section 3.4.3 below).

Each argument of `d_union` is of the form `[FS,R_List]`. Figure 3 shows the example of unifying the DAG structure associated with the `S --> NP VP` rule in (5) with the DAG structure associated with the noun phrase *Tom Sawyer* in the grammar of Appendix A.

```
(5)  d_union([[x1, [[maj,np],                                     %%% FS_1
                  [head, [[agreement, [[gender,masculine],
                                       [person,third],
                                       [num,singular]]]]],
                  [sem, [[parameter,tom],
                        [trans,_359],
                        [fun_arg, [[trans,_359],
                                  [gap,_377]]]]],
                  [gap,_377]]]],
           [[_377, []],                                         %%% RList_1
           [_359, []]]],
      [[x0, [[maj,s],                                         %%% FS_2
            [head,_636],
            [sem, [[trans,_354]],
                  [gap,_730]]],
            [x1,_767],
            [x2, [[maj,vp],
                  [head,_636],
                  [sem, [[trans,_354]],
                        [gap,_730],
                        [subcat, [[first,_767],
                                  [rest,end]]]]]]],
           [[_767, [[maj,np],                                   %%% RList_2
                   [sem, [[trans,_354],
                           [fun_arg, [[trans,_354]]]]]],
           [_636, [[form,finite]],
           [_730, [], [_354, []], [_354, []]]],
```



```

[[[x0, [[maj, s],
        [head, _636],
        [sem, [[trans, _354]]],
        [gap, _730]]],
 [x1, _767],
 [x2, [[maj, vp],
        [head, _636],
        [sem, [[trans, _354]]],
        [gap, _730],
        [subcat, [[first, _767],
                  [rest, end]]]]]],
                                     %%% FS_3

[[_767, [[maj, np],
        [head, [[agreement, [[gender, masculine],
                             [person, third],
                             [num, singular]]]]],
        [sem, [[parameter, tom],
                [trans, _354],
                [fun_arg, [[trans, _354],
                           [gap, _450]]]]],
        [gap, _450]]],
 [_636, [[form, finite]]], [_730, []], [_450, []],
 [_354, []]]).

```

As mentioned in section 2.1, the DAG unifier is used in the UNICORN system by both the parser and the grammar interpreter. In the parsing component the DAG unifier is used in an extended version of Earley's algorithm presented by Shieber (1985). However, the predicate `d_union` could equally well be embedded in alternative parsing algorithms. For that matter, it could be used quite independently of the application considered in this paper in any domain which requires a unification algorithm for DAG structures.

2.3. The Grammar Interpreter

Even though the parser itself operates on the type of DAG structures described in the previous section, users of UNICORN are not required to translate application grammars into such DAG representations themselves. Instead, users can write PATR-II style grammars that take the form of rewrite rules that are annotated by path equations. The task of translating the annotated rewrite rule into the representation required by the parser is one of the functions performed by the grammar interpretation component. The grammar interpreter also provides necessary initializations required by the parser. These initializations include the definition of a default restrictor for DAG structures (see section 3.4.2), which is used by the predictor step in the Earley algorithm, and the definition of the default start symbol for the parser.

While users are not required to encode grammars in the syntax of DAG structures, it is necessary to write input grammars that conform to the syntax of grammar rules expected by the grammar reader. The syntax for grammar rules corresponds very closely to the rule format used in PATR-II style grammars. A sample grammar that conforms to this format is given in Appendix A of this paper. For further examples of rewrite ruled annotated by path equations see Karttunen 1986 and Shieber 1986.

Each syntax rule consists of two parts: (1.) a rule skeleton that specifies which terminal and non-terminal symbols are involved in the rule, and (2.) a set of equations which provide further specifications of the symbols appearing in the rule skeleton. We can further distinguish rules that expand pre-terminal nodes to terminal strings from rules that expand non-terminals to one or more non-terminals. We will subsequently refer to the former type as terminal rules and to the latter as non-terminal rules.

The two types of rules are primarily distinguishable by the different types of rule skeletons they employ. In the case of terminal rules which specify the lexical information associated with a particular lexical item, the rule skeleton is of the form:

Word <String>:

where <String> is identical to the orthographic representation of the word(s) in question. In the case of simple lexical items, <String> will consist of a single word. However, as will be discussed shortly, <String> can also stand for the empty string (in the case of traces), or consist of two or more words (in the case of noun compounds, multi-word names, idioms, or any group of words that are considered a lexical unit). (4) gives an excerpt of the terminal rule given for the word Tom Sawyer in the grammar of Appendix A. The path equations specify Tom Sawyer as an NP whose agreement features, which are taken to be head features, include the values masculine, third, and singular for the features gender, person, and number.

- (6) Word tom sawyer:
 <maj> = np
 <head agreement gender> = masculine
 <head agreement person> = third
 <head agreement number> = singular

In the case of non-terminal rules, the skeleton is of the form

<Maj_0> -> <Maj_1> ... <Maj_n>:

where each symbol stands for one non-terminal symbol. The S → NP, VP rule of the sample grammar in Appendix A, whose DAG structure we introduced in the previous section can thus be specified as in (7).

```
(7) s → np vp:
    <x0 head> = <x2 head>
    <x0 head form> = finite
    <x0 sem trans> = <x1 sem trans>
    <x1 sem fun_arg trans> = <x2 sem trans>
    <x0 gap> = <x2 gap>
    <x2 subcat first> = <x1>
    <x2 subcat rest> = end.
```

The syntax rules in (6) and (7) also serve to illustrate the syntax of the set of path equations that can accompany rule skeletons in input grammars accepted by the UNICORN grammar interpreter. Notice that terminal and non-terminal rules differ in the syntax used for specifying paths. In non-terminal rules, each path originates with a label x0, x1, x2, etc. The number on the label corresponds to the left-to-right order of categories used in the rule skeleton. Thus, x0 always references the category on the left-hand side of the rule skeleton. x1, x2, ... xn reference categories on the right-hand side in left-to-right order. For terminal rules, however, such referencing is not necessary, since they involve a single (maj) category. Thus, paths can originate with any attribute label relevant to the lexical item in question.

Notice also that in the terminal rule in (6) it happens that the right-hand side of each equation is marked by an atomic feature value, while the left-hand side is marked by a path description which is delineated by angled brackets. By contrast, in (7) each equation happens to involve the identity of two path descriptions. Schematically, we can state the two possibilities for specifying equations as in (8a) and (8b).

```
(8) a. <PATH> = VALUE.      b. <PATH1> = <PATH2>
```

The second type of equation always gives rise to reentrant DAG structures. In this case the grammar interpreter will create a FS (feature structure) in which each of the two paths receives an index (indicated by a Prolog variable) as a value. This index also appears as a member in the reentrancy list that accompanies the FS. Thus, all indices that appear in the internal representation of terminal or non-terminal rules are ultimately derived from path equations of the second type.

The rule skeleton of the non-terminal rule that we have discussed so far contained only names of individual non-terminal symbols. However, this is not the only option for specifying non-terminal rules. A second possibility that is

supported by the UNICORN grammar reader is the use of schematic categories as in (9).

- (9) `vp -> vp x2:`
`<x0 head> = <x1 head>`
`<x0 sem trans> = <x2 sem trans>`
`<x1 sem trans> = <x2 sem fun_arg trans>`
`<x2 sem fun_arg gap> = <x1 gap>`
`<x0 gap> = <x2 gap>`
`<x1 subcat first> = <x2>`
`<x0 subcat> = <x1 subcat rest>.`

(9) specifies the right-most daughter of VP as any category x2 which matches the first element on the subcategorization list of its sister VP. Thus x2 can be taken to be a variable over any category that satisfies this constraint.

Note that even non-schematic categories such as S, NP or VP can be expressed as schematic categories, namely as schematic categories whose maj feature is specified. The rule in (9), for example, could also be specified as in (10).

- (10) `x0 -> x1 x2:`
`<x0 maj> = vp`
`<x1 maj> = vp`
`<x0 head> = <x1 head>`
`<x0 sem trans> = <x2 sem trans>`
`<x1 sem trans> = <x2 sem fun_arg trans>`
`<x2 sem fun_arg gap> = <x1 gap>`
`<x0 gap> = <x2 gap>`
`<x1 subcat first> = <x2>`
`<x0 subcat> = <x1 subcat rest>.`

In fact, the grammar interpreter always translates the rules with non-schematic category names into completely schematic rule types, thereby achieving a uniform representation for non-schematic and schematic categories.

In the grammar of Appendix A, rule (9) applies twice in order to combine a ditransitive verb such as *give* with its two non-subject NPs in order to form a verb phrase such as *give Tom Sawyer a toad*. For transitive verbs such as *paint*, rule (9) applies once in order to produce verb phrases such as *paint every fence*. Due to rule (9), the grammar of Appendix A, therefore, generates left-recursive verb phrases.

Let us conclude the discussion of the grammar interpreter by mentioning some useful predicates that users can invoke. The most important one is the

predicate `process_grammar` which takes as its only argument the file name containing an input grammar such as the one specified in Appendix A. When the grammar is processed, all terminal and non-terminal rules are added to the Prolog database. The internal syntax of these rules takes the form of an ordered pair in the case of a terminal rule and the form of a triple for non-terminal rules.

(11) Internal Rule Syntax:

- a. Terminal Rules: `<String_Length,String,DAG>`
- b. Non-terminal Rules: `<RHS_of_Rule,DAG>`

For non-terminal rules the first element specifies the right-hand side of the rule skeleton, and the second element represents a DAG structure for the information specified by the path equations that accompany the rule skeleton. For terminal rules, the string expanded by the preterminal category is specified together with the length of the string (number of words), and the DAG structure

Users can query which rules have been added to the database by invoking the predicates `show_lex_rule/1` and `show_rule/1` for terminal and non-terminal rules, respectively. `show_lex_rule` and `show_rule` provide pretty-printed copies of the internal representation of the two types of rules. (12) and (13) exemplify the use of these two predicates and show the internal representations for the lexical item `Tom Sawyer` and for the syntactic rule `S --> NP VP`.

(12) | ?- `show_rule(Right_Hand_Side)`.

```
<
[x0: [maj: s]
     [head: _143]
     [sem: [trans: _155]]
     [gap: _161]]
[x1: _167]
[x2: [maj: vp]
     [head: _143]
     [sem: [trans: _197]]
     [gap: _161]
     [subcat: [first: _167]
              [rest: end]]]
>
<
[_167: [maj: np]
       [sem: [trans: _155]
             [fun_arg: [trans: _197]]]]]
[_143: [form: finite]]
[_161: []] [_197: []] [_155: []]
>
Right_Hand_Side = [x1,x2]
```

```
(13) | ?- show_lex_rule(X).
<
  [maj:  np]
  [head:  [agreement:  [gender:  masculine]
                    [person:  third]
                    [number:  singular]]]
  [sem:  [parameter:  tom]
        [trans:  _165]
        [fun_arg:  [trans:  _165]
                  [gap:  _183]]]
  [gap:  _183]
>
<
  [_183:  []]
  [_165:  []]
>
  X = [tom,sawyer|_110];
```

Notice that the string *Tom Sawyer* in (13) is not simply encoded as an atom, but rather as a list whose tail is marked by a variable. The reasons for this list representation are mostly internal to the mechanism in the parsing component that is responsible for scanning the input string. The upshot is that we allow for terminal symbols with variable string length. This is what makes it possible to treat noun compounding and traces along with simple lexical items in UNICORN. We allow for the possibility that a preterminal can either expand the empty string (i.e. a trace) or that it can expand a string that consists of one or more words. The terminal rule for the two-word noun *a Tom Sawyer* and the terminal rule for NP trace that are included in the grammar in Appendix A are typical examples of pre-terminals that expand to something other than a single string. To achieve maximal generality we place no upper bound on the number of words that can appear in a compound lexical item.

2.4 The Parser

The parser used in the UNICORN system is based on Shieber's extension of Earley's algorithm for context-free grammars to grammars whose categories are not atomic symbols, but are made up of complex feature structures. For a detailed technical discussion of Earley's algorithm and Shieber's extension we refer the reader to Earley (1970) and Shieber (1985). Technical details of our implementation of Shieber's algorithm will be presented in section 3.3 of this paper. In this section we will concentrate on those aspects of the parsing component that will allow users to parse sentences and obtain logical forms for the sentences parsed without having to concern themselves with details of the algorithm itself.

The top-level predicate for the parser is `parse(StringList)`, which returns for any grammatical string a pretty-printed copy of the category that generates the string in question. (14) shows the successful parse of *Tom Sawyer painted every fence*, using the grammar in Appendix A.

```
(14) ?- parse([tom,sawyer,painted,every,fence]).
<
[maj: s]
[head: [form: finite]]
[sem: [trans: [quant: every]
           [range: [pred: fence]
                   [arg1: _23170]]
       [scope: [pred: paint]
                [arg1: tom]
                [arg2: _23170]]]]
[gap: minus]
>
<
[_23170: []]
>
```

(14) shows a pretty-printed version of the sentence node that is instantiated for the input string in question. Notice, however, that UNICORN does not return a complete parse tree. We made this move intentionally and do not consider it an undesirable omission. The point is that users can easily add such a facility by adding a feature called `parse` to the category on the left-hand side of each rule. This feature would take as a value the DAG structures for each of its daughter constituents. Such a technique would be similar to the way parse trees can be constructed during execution in definite clause grammars (see Pereira and Shieber 1987 for more details).

As an aid for those users who would like to familiarize themselves with the internal processing of the parser and to those users who want to debug their own input grammars, the UNICORN parser can be run in two modes which we call "on" and "off" mode. In "off" mode the parser will simply return the instantiated category that generates the input string in question. "On" mode, on the other hand, is an interactive mode which informs the user at each point which action has been performed by the parser. Since we will explain much of our implementation of the Earley/Shieber parsing algorithm, we will only give a brief preview at this point.

The parser performs the three main operations of Earley's algorithm: prediction, scanning, and completion. In the "on" mode for stepping through the parse for a given input string, the user is informed at each point what part of the input string is being processed and which of the two operations is being

performed. See section 3.3 for more discussion of our implementation of the parser and on/off mode facility.

Another feature that the UNICORN parsing package makes available is the option of modifying the start symbol that the parser uses as its initial state. As a default, the parser will take the start symbol to be a category whose only attribute is the feature *maj* and which has *S* as the value for that attribute. Thus, as a default the parser will parse input strings that are sentences. However, by invoking the predicate *change_root_category*, the user is free to override this default and invoke some other DAG as the start symbol. For example, to parse noun phrases, users can invoke '*change_root_category*([[[*maj,np*]],[]])'. To get all parses for a string of words, the user can specify the start DAG as the completely unspecified DAG (i.e. [[],[]]).

However, in certain circumstances users may find it useful to specify start symbols that are more specific than merely *S* or *NP*. For example, in a grammar that allows for *NP* gaps, as the grammar of Appendix A does, the strings in (15a) and (15b) would both be parsed as sentence nodes.

- (14) a. Tom Sawyer gave every boy a brush.
 b. Tom Sawyer gave every boy.

However, sentence (15b) should be classified as a sentence which contains an *NP* gap. In order to exclude sentences such as (15b), whose gap remains unfilled, from being parsed successfully, the user can specify the start symbol as in (15).

- (15) *change_root_category*([[[*maj,s*],[*sem*,[[*index,minus*]]]],[]])

Specifying the value *minus* for the *index* attribute that is embedded under the semantics feature is the way the grammar of Appendix A encodes the absence of a gap.

3. Implementation Details of Unicorn

The Unicorn system has three major parts: A DAG unifier, a grammar interpreter, and an Earley style parser. The DAG unifier plays a central role since it is used by both the grammar reader and the parser. We will accordingly begin our discussion of implementation details with the DAG unifier in section 3.1. A full listing of this DAG unifier is provided in Appendix B. In section 3.2 we will discuss the grammar interpreter, including how the DAG unifier is used in translating path equations into DAGs. Then in section 3.3 we will discuss how the Earley parser is extended to work with complex feature structures. Since this extension is already discussed in Shieber (1985), we will not say much about the parser itself, rather we will concentrate on describing the additional

operations on DAGs that are required for this extension. In section 3.3.1 we describe the procedure 'path_val' which takes a path and a DAG as arguments and returns the value in the DAG at the end of the path. While this function is not conceptually difficult, certain problems arise with reentrancies that make it trickier than expected. Next, in section 3.3.2 we will discuss the concept of restriction and describe our own procedure which does a modified form of restriction. Then, in section 3.3.3 we will explain our procedure for checking the subsumption relation between DAGs. Full listings for all of these procedures can be found in Appendix B.

3.1 The DAG Unifier

The DAG unifier (Appendix B) takes two DAG structures as arguments and returns their unification as output (i.e. `d_union(DAG1,DAG2,OutputDAG)`).³ The definition for unification is as in Shieber (1986). The reader familiar with term unification as in Prolog and Definite Clause Grammars should be aware that graph unification is rather different kind of unification than term unification. Term unification basically involves substitution for variables in two terms with identical arity (i.e. identical number of arguments). In graph unification, on the other hand, the idea is to find the most general graph structure that is subsumed by the two input graphs. The arity of the unified graph may be greater than the arity of either input graph. For example, in (16) both input graphs are of arity two but the output graph is of arity three. A second difference is that reentrancies can have values in graph unification so when two variables marking reentrancies are unified the unifier must find their values on the reentrancy list and then unify these values.

```
(16) d_union([[maj,np],[form,finite]],[],[],           % input
          [[form,finite],[subcat,end]],[],           % input
          [[maj,np],[form,finite],[subcat,end]],[]) . % output
```

The first step in unifying two DAGs is to append their reentrancy lists together. Unless some of the feature structures on this combined reentrancy list are unified with other feature structures, this combined reentrancy list will become the reentrancy list of the output DAG. In general, however, this combined reentrancy list will be successively modified as the parts of DAG1 are unified with the parts of DAG2.

After appending the reentrancy lists, the auxiliary function, 'aux_d_union', is called. `Aux_d_union` has three base cases and two recursive clauses. The base cases unify [] with anything and unify any atom with an identical atom.

When the base cases fail to apply, it must be the case that DAG1 is a list beginning with some feature pair [f,v], where v is a feature structure or Prolog variable. Two cases need to be considered here. Either some [f,v'] does or

does not occur in DAG2. If it does not, we simply add $[f,v]$ to the output DAG and recursively unify the rest of DAG1 with DAG2 to get the rest of the output DAG.

If some $[f,v]$ does occur in DAG2 we remove this pair from DAG2 and, as above, recursively unify the rests of DAG1 and DAG2. Then we will need to find the values of v and v' and unify these values. The complication of finding values occurs because of the fact that values can be reentrant, and these reentrancies can themselves have values as the example in (18) illustrates.

(17) $[[[form, finite]], []]$

(18) $[[[form, X], [head, [[form, X]]]], [X, finite]]$

In (17) the feature 'form' has the value 'finite'. In (18), 'form' is followed by the variable 'X', and the value 'finite' is found on the reentrancy list. For ease of reference, then, we define a function 'value' such that $value(X) = finite$ in (18) and, for consistency, $value(finite) = finite$ in (17). In general, $value(x) = x$ when x is a feature structure and, when x is a Prolog variable, $value(x) =$ the (unique) feature structure fs such that $[x, fs]$ occurs in the reentrancy list.

The procedure responsible for finding and then unifying the values of v and v' is called 'match_values'. The first clause of `match_values` catches the case where $value(v)$ and $value(v')$ have already been unified. If it is the case that v and v' are identical variables (i.e. $v == v'$) then it must be the case that their values have already been unified, so we do nothing in this case. The second clause handles the case where v and v' are different variables. In this case, we remove their values from the reentrancy list and unify these values. In addition we (destructively--see below) unify the variables v and v' . Then $[f,v]$ is added to the output feature structure and $[v, value(v) \cup value(v')]$ is added to the reentrancy list (where \cup is the operator used to indicate unification).

The third clause handles the case where v is a variable and v' is a feature structure. In this case the value for v is removed from the reentrancy list and unified with v' . Then $[v, val(v) \cup v']$ is put back on the reentrancy list and $[f,v]$ is added to the output feature structure. The fourth clause is the mirror image of the third clause. In this case v is a feature structure and v' is a variable. The fifth, and final, clause of `match_values` handles the case where both v and v' are feature structures. In this case, v and v' are unified and then $[f,v \cup v']$ is added to the output feature structure.

Like other graph unification algorithms mentioned in the literature, this algorithm has the property that the input DAGs can be destructively modified in the process of unifying them. Specifically, clause two of 'match_values' destructively unifies variables marking reentrancies. Consequently, the use of 'd_union' requires a certain amount of caution. Previous discussions of this problem have focused on efficient copying procedures and methods of structure

sharing (see Shieber, Pereira, Karttunen, and Kay 1986). While we have nothing to contribute to this rather technical literature, we have found some practical methods of efficiently copying in Prolog. The most straight-forward way is to use a procedure such as that in (19) to explicitly copy DAGs before using them as input in 'd_union'. Somewhat more efficiently, one can embed calls of 'd_union' within 'findall', which has the property of suppressing destructive changes.⁴ For example one could use a procedure like the simplified procedure in (20) to do prediction in the Earley parser. One further way of using these copying procedures would be to embed the copying into the 'd_union' procedure itself. The easiest way to do this would be to delay the destructive variable binding in clause two of match_values by keeping a binding list. Then one could get as output a DAG and a binding list which could be copied at the last minute just before the variables in the binding list are destructively unified. Then in the case of unification failure, no copying would be done at all.

```
(19) copy(X,Y):- findall(Z,Z=X,[Y]).
```

```
(20) findall(PredictedDag,
          (right_of_dot(DAG1),
           root_dag_from_rule_in_database(DAG2),
           d_union(DAG1,DAG2,PredictedDag)),
          Predictions).
```

One more subtle method of copying is to use the built-in copying implicit in Prolog. It is an important design feature of Prolog that clauses in the database cannot be modified except by explicit uses of 'assert' or 'retract'. In particular one cannot query the database for some lexical entry and then destructively modify the database by unifying that lexical entry with some other DAG. In effect, every time the database is queried a fresh copy is produced, leaving the original clauses for lexical entries and phrasal rules unaffected.

3.2 The Grammar Interpreter

The grammar interpreter reads rules in the form shown in (21) and translates them into the form shown in (22). The form in (22) is a two member list. The first member is [x1,x2] which represents the right-hand side of the rule and the second member is a DAG in list representation (using Prolog internal variables).

```
(21) vp -> vp x2:                                %% phrase structure rule
      <x1 subcat first> = <x2>                    %% path equations
      <x0 head> = <x1 head>
      <x1 subcat rest> = <x0 subcat>.
```

```
(22) [[x1, x2],                                     %% right-hand side of PS rule
      [[x0, [[maj, vp],                             %% DAG for PS rule
          [head, _105],
          [subcat, _111]]],
      [x1, [[maj, vp],
          [subcat, [[first, _135], [rest, _111]]],
          [head, _105]]],
      [x2, _135]],
      [[_111, []], [_105, []], [_135, []]]]]
```

The grammar interpreter consists of three main parts. The first part processes the body of the rule (i.e. $vp \rightarrow vp \ x2$), the second part processes the path equations and the third part creates the DAG which is asserted into the database. We will discuss these three parts in order.

The first part (which we call 'process_body') does two things. First it changes the form of the right-hand side of the rule. In (21) it would change ' $vp \ x2$ ' to $[x1, x2]$. The left-hand side is thrown away since it is always known to be ' $x0$ '. Then 'process_body' creates a DAG for the known values for maj, in this case $[[x0, [[maj, vp]], [x1, [[maj, vp]]]]$. The maj value for ' $x2$ ' is unknown but its value is constrained by the first path equation ' $\langle x1 \text{ subcat first} \rangle = \langle x2 \rangle$ '. The DAG obtained from the rule body is saved in order to be unified later with the DAGs obtained from the path equations.

The second part (which we call 'process_constraints') creates a list of feature structures (one for each path equation) and it creates a single reentrancy list for all of the variables used in these feature structures. There are two separate kinds of path equations that need to be handled: those like (23) with a path on either side of the equal sign, and those like (24) with a path on the left side and a value on the right side.⁵

(23) $\langle x0 \text{ head} \rangle = \langle x2 \text{ head} \rangle$

(24) $\langle x0 \text{ head form} \rangle = \text{finite}$

In processing the left side of the equation in (23), 'process_constraints' will create a feature structure of the form $[[x0, [[head, X]]]]$. The variable X will be recorded and used again in the feature structure structure for the right side of the equation. Then the reentrancy $[X, []]$ will be added to the reentrancy list. At this point none of the reentrancies will have values other than $[]$ since it is impossible to represent any more specific reentrant value in a single path equation.

In processing the equation in (24) the left side is processed as in (23) (i.e. forming the feature structure $[[x0, [[head, [[form, Y]]]]]]$). Then on encountering the atom 'finite', the variable 'Y' will be unified with this atom. Nothing will be added to the reentrancy list in this case.

The third part of 'process_grammar' (shown in (25)) takes all of the feature structures obtained from 'process_body' and 'process_constraints' along with the reentrancy list from 'process_constraints' and unifies them together to form one DAG. Since 'd_union' will only unify two DAGs at a time, this procedure recursively goes through the list of feature structures and unifies in just one at a time.

```
(25) optimize_dag([],R_List,[],R_List).
    optimize_dag([FirstFS|RestFSs],R_List,OptFS,OptR_List) :-
        optimize_dag(RestFSs,R_List,OptRestFSs,OptR_List1),
        d_union([FirstFS,[],
                [OptRestFSs,OptR_List1],
                [OptFS,OptR_List]]).
```

While this procedure looks straightforward, it actually uses 'd_union' in a somewhat unusual manner. Normally the syntax of 'd_union' is `d_union(InputDAG1,InputDAG2, OutputDAG)`, but in this case the first and second arguments are not proper DAGs, since all of the reentrancies are recorded in the second DAG. Thus even though "FirstFS" is a feature structure that may contain variables which should indicate reentrancies, it is used here with a null reentrancy list. This trick works anyway since the first step in 'd_union' is to append together the reentrancy lists of the two input DAGs.

The processing of lexical entries is quite similar. The lexical entry in (26) is processed into the form in (27) and asserted into the database as a value of 'lex_rule(X)'.

```
(26) Word tom sawyer:
    <cat> = np
    <head agreement gender> = masculine
    <head agreement person> = third
    <head agreement number> = singular.
```

```
(27) [2,
      [tom,sawyer|_92],
      [[[cat,np],
        [head,[agreement,[gender,masculine],
                  [person,third],
                  [number,singular]]]]]],
      []];
```

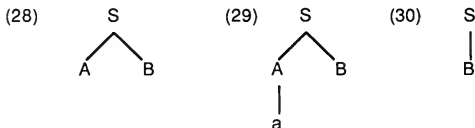
The main difference is that 'process_body' creates the incomplete list `[tom,sawyer|_92]` and it also returns a number (in this case, 1) which indicates the number of words in the list. In this way one can have lexical items of variable length. A simple common noun like *fence* would be

[1,[fence|_X],DAG_for_fence] and a trace would be [0,X,DAG_for_trace]. The reason for creating lexical items in this form is explained in the next section.

3.3 The Earley Parser

The parser is pretty much as described in Earley (1970), with the modifications indicated in Shieber (1985). Therefore, in this paper we will describe just one innovation we have made and then in the following sections we will discuss the operations on DAGs that are needed to make Shieber's extension of Earley's algorithm work. For those users who are interested on following a trace of the parser's operation we have provided a trace mode which we will also describe below.

The main innovation we have made is in the handling of lexical entries. As described in Earley (1970), there are three steps in processing a lexical item. The following example illustrates these three steps. Imagine that the parser has predicted the structure shown in (28). Furthermore assume that the rule 'A -> a' exists in the grammar and that the next item in the input is 'a'. First, the predictor makes the prediction in (29). Second, the scanner notices that the prediction matches the input and scans the 'a'. Finally the completer updates the prediction as shown in (30).⁶



While this method works fine with the types of grammars Earley discusses, it would fail miserably with a natural language grammar. To see this, imagine that the preterminal 'A' is replaced by 'N' for noun. In this case the predictor would have to predict every noun in the lexicon and then have the scanner try to scan that noun. Obviously this would take too much time. The solution to this problem is apparent. The predictor should look at the input first and only consider predicting lexical entries that match the input. If the prediction matches the input then we know immediately that it will be scannable and completable, so all three steps can be combined into one.

The question that remains is what do we mean by 'match the input.' In natural language, terminals can be of variable length. Compounds are of length greater than one and traces are of length zero. It is clear that in all these cases we want to predict a lexical item when that lexical item is a prefix of the input. Rather than define a Prolog predicate for prefix, however, we use the built in pattern matching of Prolog. This explains why in the preceding section

we created a lexical entry with [tom,sawyer|_X] rather than [tom,sawyer]. Thus rather than making a check like: `prefix([tom,sawyer],Input)`, we can directly find the lexical entries that match the input with the query: `lex_rule(Num,Input,DAG)`. In order to make this system work, we need the first argument of `lex_rule/3` to tell us the length of the lexical item. In Earley's presentation of the algorithm, the result of a scan is always put into the next state set. In this case, however, we need the variable 'Num' to tell us in which state set to put the result of the scan. If 'Num' is 1, we put the result in the next state set. In the case of 'tom sawyer' 'Num' will be 2 so the result will be put into the next but one state set. If 'Num' is 0 (i.e. for a trace) then the result is put into the current state set. Thus the parser handles traces in a completely general manner. Still, of course, there is some cost involved. The parser will attempt to predict traces everywhere (presuming there are traces in the grammar). Furthermore, the parser must continue to make predictions even when the input is exhausted. For this reason it may be preferable to develop attribute-value grammars that don't use traces, such as the version of HPSG described in Pollard (1988) or Cooper's "Wholewheat Syntax" 1982.⁷

Given an understanding of Earley's algorithm and an understanding of our modification for lexical entries, the user should be able to follow the trace mode we have provided. To activate the trace mode, the user types "on" before parsing a sentence. The parser then prints out a record of each prediction, scan, or completion that is made. As an example, suppose we're parsing the sentence 'Tom Sawyer smiles' with the grammar in (31).

```
(31) s -> np vp:
    <x0 head> = <x2 head>
    <x2 head subject> = <x1 head>.

vp -> v:
    <x0 head> = <x1 head>.

Word tom sawyer:
    <maj> =np
    <head agreement gender> = masculine
    <head agreement person> = third
    <head agreement number> = singular.

Word smiles:
    <maj> = v
    <head form> = finite
    <head subject agreement person> = third
    <head subject agreement number> = singular.
```

Starting from the 's -> np vp' prediction, we get the trace shown below in (32). As shown, the tracer first writes out the state currently being processed

along with the current input. The state contains four items of information. First comes the 'state type'. This indicates whether the state is the result of prediction scan or completion. It is important to have this piece of information since when new states are added to the queue, new predictions (scans, completions) must not be subsumed by previous predictions (scans, completions). The second piece of information is the rule which licensed the prediction being worked on. The third item indicates in which state set the prediction being worked on was made. And the fourth item shows the DAG for the rule.

After showing the state being processed, the tracer writes out what scans, predictions or completions are made from that state. In this case, a scan is made, since the lexical entry for *Tom Sawyer* matched the sub-DAG for 'x1', the item "to the right of the dot" in Earley's sense. Following the scan state, the tracer writes out "enqueue" to indicate that the new state was put onto the queue. Since this was a scan, of course, this means that it was enqueued into the next state set. A state will fail to be enqueued if it is subsumed by a state already on the queue. In this case, nothing had already been put onto the next state set, so the scan was necessarily enqueued. Next the tracer writes out "predict none," which indicates that no predictions were made. No predictions could be made with the grammar in (31) because there are no phrasal expansions for NP in this small grammar. Since no predictions were made, the parser is now done with the first state set. The tracer, therefore, writes out "go to next state set" and then writes the new state to be processed, which completes the cycle.

(32) looking at:

```

state type: prediction
rule = [x0, [x1, x2]]
predicted in state set #0
<
  [x0:  [maj:  s]
        [head:  _394]]
  [x1:  [maj:  np]
        [head:  _412]]
  [x2:  [maj:  vp]
        [head:  _394]]
>
<
  [_394: [subject:  _412]]
  [_412: []]
>
input= [tom, sawyer, smiles]
|:
scan
state type scan
rule = [x0, [x2]]

```



```

predicted in state set #0
<
  [x1: [maj: np]
      [head: _2709]]
  [x0: [maj: s]
      [head: _2727]]
  [x2: [maj: vp]
      [head: _2727]]
>
<
  [_2709: [agreement: [gender: masculine]
                    [person: third]
                    [number: singular]]]
  [_2727: [subject: _2709]]
>
enqueue

predict none

go to next state set

looking at:
state type scan
rule = [x0,[x2]]
predicted in state set #0
<
  [x1: [maj: np]
      [head: _2709]]
  [x0: [maj: s]
      [head: _2727]]
  [x2: [maj: vp]
      [head: _2727]]
>
<
  [_2709: [agreement: [gender: masculine]
                    [person: third]
                    [number: singular]]]
  [_2727: [subject: _2709]]
>
input= [smiles]

```

3.4.1 Values at Ends of Paths

In this and the next two sections we discuss some operations on DAGs that are necessary for the operation of the parser. We include these procedures

here primarily because they illustrate how to handle some of the intricacies of the DAG representation in UNICORN. The first procedure which we call 'path_val' finds the value at the end of a path. This procedure is used in both the prediction and completion steps in the parser. For example, if the parser is looking at the following first state in the parse trace given above and repeated here as (33), the parser must look at the sub-DAG that occurs at the end of the path <x1> in order to make a prediction. Here the path is only of length one, but it will be useful to have a more general procedure for path_value, primarily for the purpose of displaying subparts of complex DAGs.

```
(33) state type: prediction
      rule = [x0, [x1, x2]]
      predicted in state set #0
      <
      [x0: [maj: s]
          [head: _394]]
      [x1: [maj: np]
          [head: _412]]
      [x2: [maj: vp]
          [head: _394]]
      >
      <
      [_394: [subject: _412]]
      [_412: []]
      >
      input= [tom, sawyer, smiles]
```

We start off by describing a procedure called 'naive_path_val' that simply follows a path and returns the feature structure found at the end of the path. For example, 'naive_path_val' gives the result found in (34).

```
(34) naive_path_val([head, subject],           % Path
                    [[agr, X],                 % Input DAG
                     [form, Y],
                     [head, [[subject, [[agr, X]],
                                     [form, Y]]]],
                     [[X, third_sg], [Y, finite]]],
                    [[agr, X]]).               % Output FS
```

This much will be easy to define. However, the output here is not quite what we want. Instead of the output feature structure we would like an output DAG, which means that we need to find a reentrancy list to go with this feature structure. If we use the reentrancy list from the input DAG, however, we get the non-well formed DAG: [[[agr, X]], [[X, third_sg], [Y, finite]]]. There are two obvious problems with this "DAG". First the variable 'X' marks a "reentrancy" that only occurs once in the feature structure and, worse, the variable 'Y' marks a

"reentrancy" that doesn't even occur at all in the feature structure. In order to define the fully correct 'path_val', it will be necessary to filter out these false reentrancies.

We begin, now, with the simple 'naive_path_val'. This can be defined as a simple recursive procedure. The base case will take care of paths of length one and the recursive part will give the transitive closure of this base case. The base case is given in (35). For a path of length one what we want is a procedure that gives the value of any given feature. The procedure 'value' looks for the value either in the feature structure or in the reentrancy list (see Appendix B for 'feat_val_member' which is used for finding values on reentrancy lists). If no value for the feature is found then [] is returned.⁸

```
(35) value(Feat, [FS,R_List],Val):-
      member([Feat,V1],FS),!,
      if(nonvar(V1),Val =
V1,feat_val_member([V1,Val],R_List)).
      value(_F,_Dag,[]).
```

Once this is defined, then 'naive_path_val' (in (36)) is simply its transitive closure.

```
(36) naive_path_val([Feature],DAG,OutputFS):- % base case
      value(Feature,[FS,R_List],OutputFS).
      naive_path_val([Feature|RestPath],[FS,R_List,OutputFS):-
      value(Feature,DAG,Val),
      naive_path_val(RestPath,[Val,R_List],OutputFS).
```

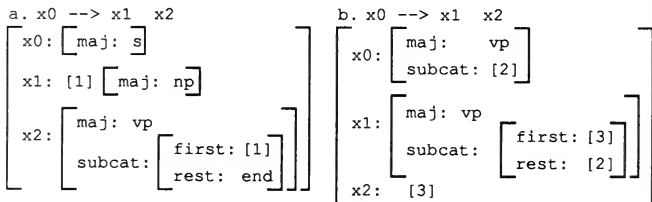
Now to extend this to the fully correct 'path_val' requires some complication. The basic idea is to search through the output feature structure to find which variables occur at least twice (either in the feature structure itself or in its reentrancies). These variables will be the only ones marking true reentrancies so the output reentrancy list must contain just those reentrancies on the input reentrancy list which are marked by these variables. For the case of reentrancy variables which don't occur at all in the feature structure (such as 'Y' in [[[agr,X],[[X,third_sg],[Y,finite]]]), these can simply be thrown away (giving [[[agr,X],[[X,third_sg]]]). Then for the case of variables that occur exactly once in the feature structure (such as 'X' in [[agr,X]]), these reentrancies need somehow to be undone. Undoing reentrancies is not hard: if we have a list of variables occurring exactly once in the feature structure, we can first look through the input reentrancy list to find just those reentrancies marked by these variables, (for example, in [[[agr,X],[[X,third_sg]]] we find the reentrancy [X,third_sg]), then we simply unify the reentrancy variable with the reentrant feature structure (i.e. in the above example, we use 'X = third_sg', then both instances of 'X' will be bound to 'third_sg', which has the effect of putting 'third_sg' in as the value of 'agr' -- see the third clause of 'undo_reentrancies' in Appendix B. Unfortunately,

this way of undoing reentrancies is destructive so one must be a little more careful. Since it is necessary to search all the way through the output feature structure anyway to find the false reentrancies, it takes little more work to replace the variables in the process. Then the destructive binding will have no bad consequences. The complete code incorporating this solution is listed in Appendix B. The good news is that the fully correct 'path_value' is not always needed. Often the simpler 'naive_path_val' is good enough, as we will see in the next section.

3.4.2 Restriction

Restriction is the major innovation of Shieber (1985) which makes it possible to extend Earley parsing to complex feature structures. Unfortunately, Shieber illustrates this concept with his so-called "counting grammar" which appears to have dubious relevance to natural language parsing. The same point can be illustrated, however, with list valued subcat features as used in HPSG. To show this we first define the partial grammar in (37). The grammar would need rules for NPs and Vs to actually yield any strings, but this is enough of the grammar to illustrate the point.

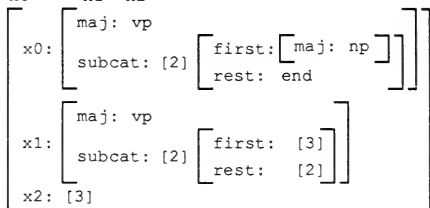
(37)



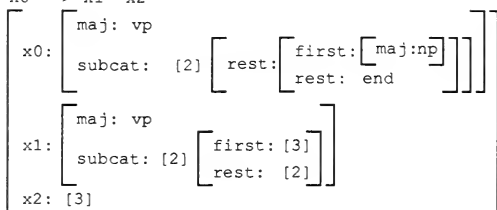
Assume now that we start with the first rule and parse a generic label NP (i.e. an NP with the DAG $[[[maj,np]],[]]$ and no other more specific syntactic or semantic features). We then have the rule $x_0 \rightarrow x_2$ with the same DAG as in rule 1, so we are now ready to parse a VP. In a standard Earley parser we would search through the grammar for any rules that have VP on the left-hand side. In attribute value grammars, on the other hand, it is not always possible to do this since 'maj' has no special status as a feature. In some cases it may happen that left-hand sides are unmarked for this feature. Shieber's "naive solution" (which he considers and correctly dismisses) would be to take the entire sub-DAG which is the value of the path $[x_2]$ and unify this with the left-hand side of some rule (i.e. rule 2). If we do this we get the prediction in (38), and if we do it again we get the prediction in (39). Clearly, we could go on ad

indefinitum making new predictions which crucially are not subsumed by old predictions.

(38) $x_0 \rightarrow x_1 \ x_2$



(39) $x_0 \rightarrow x_1 \ x_2$



Shieber's solution is to limit the amount of structure the parser can consider in making predictions. The structure can be limited by considering only a designated set of paths which Shieber calls a "restrictor". For each path, if the path has an atomic value in the DAG to be restricted, that path will have the same atomic value in the restricted DAG. If the path has a complex value or no value in the DAG to be restricted, it will have no value in the restricted DAG. For example, if we apply the restrictor $[[\text{maj}], [\text{head}, \text{form}], [\text{agr}]]$ to the DAG

$[[[\text{maj}, \text{np}], [\text{head}, [[\text{form}, \text{normal}]]], [\text{agr}, [[\text{person}, \text{third}], [\text{num}, \text{sing}]]]], []]$,

we get the DAG $[[[\text{maj}, \text{np}], [\text{head}, [[\text{form}, \text{normal}]]], []]$. Shieber also stipulates that if any of the paths in the restrictor have reentrant values, these values will also be reentrant in the restricted DAG. We have found it convenient, however, not to follow him on this point. It appears that when reentrancies are thrown away, only very few spurious predictions are made, but the restriction algorithm is greatly simplified. Of course the parser is still correct when spurious predictions are made, since these predictions will not be completed. In order to explain our

restriction algorithm, we start with a hard coded restrictor (in 40) just for the restrictor `[[maj],[head,form]]`.

```
(40) restrict (X_j,Dag,RestrictedDag):-
    naive_path_val([X_j,maj],Dag,MajVal1),
    naive_path_val([X_j,head,form],Dag,HFVal1),
    if(list(MajVal1),MajVal = [], MajVal = MajVal1), 9
    if(list(HFVal1),HFVal = [], HFVal = HFVal1),
    make_restrictor([MajVal,HFVal],RestrictedDag).

make_restrictor([],[],[[],[]]).
make_restrictor([],HFVal,
    [[x0,[head,[form,HFVal]]]],[]).
make_restrictor([MajVal,[]],[[x0,[maj,MajVal]]],[]).
make_restrictor([MajVal,HFVal],
    [[x0,[maj,MajVal],
        [head,[form,HFVal]]]],
    []).
```

The general version of restriction (in Appendix B) is just an extension of this method. The procedure 'change_restrictor' first retracts the clauses in (40) and then asserts a new clause for 'restrict' and a set of clauses for 'make_restrictor'. The new 'restrict' clause uses a generalized version of 'naive_path_val' called 'get_vals' which finds the values for a set of paths. The procedure for asserting the 'make_restrictor' clauses is somewhat more complicated. Since each path either may or may not end in some atomic value, we need to construct a template restricted DAG for each possible combination. It would appear, then, that the number of 'make_restrictor' clauses would be the square of the number of paths in the restrictor. In fact, this is not the case since there are some pairs of paths that cannot both have values. For example if [head,trans] has an atomic value then [head,trans,arg1] could not possibly also have a value, and if [head,trans,arg1] has any value then [head,trans] would not be able to have an atomic value. The way we have worked this out is as follows: First non-deterministically pick a subset of paths that might have atomic values ('make_selection'). Then try to combine this set of paths into a coherent DAG template. If successful, assert a clause of 'make_restrictor' with the set of paths as the first argument and the DAG template as the second argument and then backtrack to make a new selection of paths and continue the cycle. If a set of paths cannot be combined into a coherent DAG template, then we throw away that set and backtrack to 'make_selection' as above.

3.4.3 Subsumption

Subsumption is a very important test for the parser. Whenever a new prediction (scan/completion) is made the parser must check that the new DAG is

not subsumed by the DAG of previous predictions (scans/completions) in the queue; otherwise the parser can fall into the left recursion trap. For example, a rule like 'vp -> vp x2' in Appendix A could cause the parser to keep predicting VPs forever unless there were a check to see that the new predictions were subsumed by previous predictions. In this case, of course, the new predictions would not only be subsumed by the old predictions, but they would actually be identical to the old predictions. Nevertheless, we don't want to check identity simply because identity is a more difficult test: DAG1 and DAG2 are identical if DAG1 subsumes DAG2 and DAG2 subsumes DAG1. Subsumption will always be a sufficient test since if we keep only the most general predictions, these predictions will allow any completions that a more specific prediction would allow.

Informally DAG1 subsumes DAG2 iff DAG2 contains all of the information in DAG1 and possibly more. If DAG2 does contain more information than DAG1 then we say that DAG2 extends DAG1. There are two ways in which DAG2 can extend DAG1. First DAG2 may have a value for some path which does not exist in DAG1. The idea here is that DAGs contain partial information so even though DAG1 does not have a value for this path, it could be extended to have a value. The other way DAG2 can extend DAG1 is to have reentrant values (token identity) for two paths where in DAG1 the same two paths have values that just happen to be identical (type identity). Thus the DAG in (41) subsumes the DAG in (42).

$$(41) \left[\begin{array}{l} \text{subj:} \left[\text{agr:} \left[\text{num:third} \right] \right] \\ \text{pred:} \left[\text{agr:} \left[\text{num:third} \right] \right] \end{array} \right]$$

$$(42) \left[\begin{array}{l} \text{subj:} \left[\text{agr:[1]} \left[\text{num:third} \right] \right] \\ \text{pred:} \left[\text{agr:[1]} \right] \end{array} \right]$$

The subsumption procedure (Appendix B) has four clauses. The first two clauses are the base cases. The first says that the null DAG ($[[[]]]$) subsumes anything, and the second says that atoms subsume identical atoms. The other two clauses are recursive conditions. The first of these handles the case where a feature in DAG1 ends in a non-reentrant value. In this case this value must subsume the value of the same feature in DAG2. It doesn't matter whether or not that value is reentrant in DAG2. In the fourth case a feature in DAG1 ends in a reentrant value. In this case again this value must subsume the value of the same feature in DAG2. Moreover, in this case the value in DAG2 must be reentrant since, otherwise, a DAG like (42) above, would subsume (41).

Given this definition for subsumption between DAGs, a slight generalization gives a definition for subsumption between states as described in 3.4.0 (in the discussion of the "trace" mode. State 1 will subsume state 2 iff the first three members of state 1 are identical to the first three members of state 2 and the fourth member of state 1 (i.e. the DAG) subsumes the fourth member of state 2.

4. Conclusion

We would like to conclude by briefly discussing some future directions we plan to pursue in our research on UNICORN. One such direction involves the use of attribute value grammars for the purposes of semantic interpretation. Even though such work is already under way in various instantiations of attribute value grammars (cf. Halvorsen 1983 for LFG, Pollard and Sag 1988 for HPSG, and Shieber 1986 and the present paper for PATR-grammars), some of the more intricate aspects of semantic interpretation remain to yet be explored in this formalism. In Gerdemann and Hinrichs (ms) we discuss how one particularly interesting area of current research in formal semantics, the semantics of generalized quantifiers, can be treated in attribute-value grammars accepted by UNICORN, including the non-deterministic scoping of quantifiers.

A second line of research that we would like to pursue is the question of how to use UNICORN for the purposes of natural language generation. We plan to study extensively how to run UNICORN in reverse so that, given a logical form, it will produce a syntactic string as output. It will be interesting to see what modifications, if any, are needed in order to turn UNICORN into a reversible system that can be used for both parsing and generation. Our initial explorations in this area have yielded promising results and will be followed up in detail by Gerdemann (in preparation).

A third topic that will be important for future extensions of UNICORN concerns the representation of feature structures as data types, an approach that has been argued for convincingly by Pollard and Sag 1988. The UNICORN system, as it stands, provides no facility to state generalizations across categories. Such a facility would, of course, greatly simplify the grammar writing process, but would also be of potential use in the parser itself. We plan to explore these possibilities by encoding feature structures in inheritance networks of KL-ONE (Brachman and Schmolze 1985). We are grateful to ISI for making the KL-ONE software available which will greatly facilitate our efforts on this aspect of future extensions of UNICORN.

NOTES

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¹ UNICORN stands for UNification-based natural language processing system from the CORNfields.

² The grammar in Appendix A, thus, assumes a treatment of subcategorization à la HPSG (Pollard and Sag 1987) in which subject NPs are subcategorized for. The list character of subcategorization is handled by treating the value of *subcat* in terms of two features *first* and *rest* which play a role similar to the head and tail of a list in LISP or Prolog.

³ The DAG unifier runs only in the mode `d_union(Input,Input,Output)`. We are not aware of applications requiring the reverse mode: `d_union(Output,Output,Input)`. It might be thought that the reverse mode would be useful for generation but our initial results using UNICORN for generation continue to use `d_union` in the forward mode.

⁴ Both (19) and (20) rely on this property of 'findall'. As pointed out to us by Bob Wengert, this property is due to the implicit existential quantification of variables inside the body of 'findall'.

⁵ In addition to these, we have experimented with equations of the form `<path> = []`, meaning that the path has some unknown value. Such an equation could be used, for example in the 's -> comp s' rule in Appendix A, which we repeat here for convenience:

```
i.  s -> comp s:
    <x2 rel> = minus
    <x0 rel> = plus
    <x0 sem> = <x2 sem>
    <x0 gap index> = <x2 gap index>.
```

If we had put the feature 'gap' on the `<x0 sem>` path, then we could have left out the equation `<x0 sem gap index> = <x2 sem gap index>` since this is included in the equation `<x0 sem> = <x2 sem>`. But omitting this equation would allow the possibility of forming a relative clause even when the lower sentence has the value 'minus' for the path `<sem gap>`; i.e. one could form a relative clause like 'that Tom Sawyer smiled' with no gap. One could solve this

problem with the equation $\langle x2 \text{ sem gap index} \rangle = []$, which rules out the possibility of 'gap' having the value 'minus'. As for the grammar interpreter, equations like $\langle \text{path} \rangle = []$ can be handled in the same manner as equation (24).

⁶ Actually Earley speaks of moving the "dot" to the right of the 'A'. The effect of this is identical to removing 'A' from the prediction.

⁷ One other difference between our parser and the standard Earley parser about which we have little to say is that the Unicorn system lacks any kind of lookahead.

⁸ Here we are not distinguishing between features that happen not to have values and features that couldn't possibly have values. For example the atomic DAG [finite,[]] could not be further instantiated to have a value for 'subcat', yet according to (35) the value of the feature is []. If one needed to make such a distinction, it would be easy to modify this procedure.

⁹ In practice these two 'if' clauses are not needed since ' $\langle \text{maj} \rangle$ ' and ' $\langle \text{head form} \rangle$ ' are always atomic valued paths.

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Appendix A

The grammar in this appendix includes the following features: list-valued subcategorization features, logical form construction, quantifiers, traces, compound nouns, and relative clauses with object gaps. All of these features are illustrated in the following parse:

```
| ?- parse([every,fence,that,tom,sawyer,painted,shines]).
<
[maj: s]
[head: [form: finite]]
[sem: [trans: [quant: every]
            [range: [pred: and]
                    [conj1: [pred: fence]
                              [arg1: _39497]]
                    [conj2: [pred: paint]
                              [arg1: tom]
                              [arg2: _39497]]]
            [scope: [pred: shine]
                    [arg1: _39497]]]]
[gap: minus]]
>
<
[_39497: []]
>
```

Most of the features in this parse are self-explanatory. Only the feature 'gap' requires explanation. The feature 'gap' can take either a complex or an atomic value. It takes the atomic value 'minus' to indicate that there is no gap, as is the case in the above parse. If there is a gap it takes the complex value `[[index,Var]]` where the value of 'Var' will be the translation of the constituent that is gapped. The following parse shows the case of a direct object gap:

```
| ?- parse([tom,sawyer,painted]).
<
[maj: s]
[head: [form: finite]]
[sem: [trans: [pred: paint]
            [arg1: tom]
            [arg2: _12192]]]
[gap: [index: _12192]]
>
<
[_12192: []]
>
```

Since the path `<gap index>` has a value, this phrase can be used by the relative clause rule 's -> comp s', which includes the path equation `<x0 gap index> = <x2 gap index>`. The idea here is that if 'gap' has the value 'minus' then the values of these two paths will be undefined and hence not equal to each other (in this respect we follow the logic of attribute value grammars in Johnson 1987). Given this equation, then, we can parse *that Tom Sawyer painted* as a relative clause but correctly fail to parse *that Tom Sawyer painted a fence* as a relative clause. The feature 'rel' in this rule has the effect of ruling

out iterated complementizers. With or without a complementizer this clause could combine with a noun given the rule $N \rightarrow N S$:

```
| ?- parse([fence,tom,sawyer,painted]).
<
[maj: n]
[sem: [trans: [pred: and]
              [conj1: [pred: fence]
                      [arg1: _31446]]
              [conj2: [pred: paint]
                      [arg1: tom]
                      [arg2: _31446]]]]]
[gap: [index: _31446]]
>
<
[_31446: []]
>
```

This, in turn, combines with the determiner 'every' to give the following:

```
| ?- parse([every,fence,tom,sawyer,painted]).
<
[maj: np]
[head: [agreement: [person: third]
                  [number: singular]]]
[sem: [trans: [quant: every]
              [range: [pred: and]
                      [conj1: [pred: fence]
                              [arg1: _30752]]
                      [conj2: [pred: paint]
                              [arg1: tom]
                              [arg2: _30752]]]
              [scope: _30794]]
[fun_arg: [trans: _30794]
           [index: _30824]]
[parameter: _30752]]
[gap: [index: _30824]]
>
<
[_30752: []]
[_30794: []]
[_30824: []]
>
```

The new features in this DAG, 'fun_arg' and 'parameter' are used to handle the type raising necessary to give a Montague style analysis of quantified and referential noun phrases. Before explaining how these features work, let us compare the above parse with the parse for a referential NP:

```
| ?- parse([tom,sawyer]).
<
[maj: np]
[head: [agreement: [gender: masculine]
                  [person: third]
                  [number: singular]]]
[sem: [parameter: tom]
      [trans: _3013]
      [fun_arg: [trans: _3013]
                [index: _3043]]]
[gap: [index: _3043]]
>
<
[_3043: []]
[_3013: []]
>
```

Consider first the path <sem parameter>. In the case of the referential NP, the value of this path is 'tom'. When 'tom sawyer' combines with a VP, this is the value that will be fed into the argument position in the translation. In the case of a quantified NP, what gets fed into the argument position is a variable (as in the first parse in this appendix). As in Montague Grammar, our grammar treats NPs as functors. Thus, the VP semantics has to be fed back into the NP semantics before the translation is passed up to the mother. We do this using the feature 'fun_arg'. The name is mnemonic for functor and argument, reflecting the Janus-head nature of NPs in our grammar: Semantically the VP is an argument to the NP semantics, while syntactically the VP is treated as a functor since it subcategorizes for the NP. With these rules we can now parse the more complex example below:

```

| ?- parse([tom,sawyer,gave,every,boy,a,brush]).
<
[maj: s]
[head: [form: finite]]
[sem: [trans: [quant: exists]
           [range: [pred: brush]
                   [arg1: _44801]]
        [scope: [quant: every]
                 [range: [pred: boy]
                         [arg1: _44837]]]
        [scope: [pred: gave]
                 [arg1: tom]
                 [arg2: _44801]
                 [arg3: _44837]]]]]]
gap: minus]
>
<
[_44801: []]
[_44837: []]
>

```

%% The Grammar

```

s -> np vp:
<x0 head> = <x2 head>
<x0 head form> = finite
<x0 sem trans> = <x1 sem trans>
<x1 sem fun_arg trans> = <x2 sem trans>
<x0 gap> = <x2 gap>
<x2 subcat first> = <x1>
<x2 subcat rest> = end.

```

```

s -> comp s:
<x2 rel> = minus
<x0 rel> = plus
<x0 sem> = <x2 sem>
<x0 gap index> = <x2 gap index>.

```

```

vp -> v:
<x0 head> = <x1 head>
<x0 sem trans> = <x1 sem trans>
<x0 gap> = minus
<x0 subcat> = <x1 subcat>.

```

```

vp -> vp x2:                                     % Note left recursion
<x0 head> = <x1 head>
<x0 sem trans> = <x2 sem trans>
<x1 sem trans> = <x2 sem fun_arg trans>
<x2 sem fun_arg gap> = <x1 gap>
<x0 gap> = <x2 gap>
<x1 subcat first> = <x2>
<x0 subcat> = <x1 subcat rest>.

np -> det n:
<x0 head> = <x2 head>
<x0 sem> = <x1 sem>
<x0 sem fun_arg gap> = <x0 gap> % NP doesn't introduce a gap
<x1 subcat first> = <x2>
<x1 subcat rest> = end.

n -> n s:
<x0 sem trans pred> = and
<x0 sem trans conj1> = <x1 sem trans>
<x0 sem trans conj2> = <x2 sem trans>
<x1 sem parameter> = <x2 gap index>
<x0 sem parameter> = <x2 gap index>.

Word that:
<maj> = comp.

Word :                                           % This is a trace
<maj> = np
<sem parameter> = <gap index>
<sem fun_arg gap> = minus                       % Don't combine with a vp
                                                %that already has a gap
<sem fun_arg trans> = <sem trans>.

Word shines:
<maj> = v
<head form> = finite
<sem trans pred> = shine
<sem trans arg1> = <subcat first sem parameter>
<subcat first maj> = np
<subcat first head agreement person> = third
<subcat first head agreement number> = singular
<subcat rest> = end.

```


Word smiles:

```

<maj> = v
<head form> = finite
<sem trans pred> = smiles
<sem trans arg1> = <subcat first sem parameter>
<subcat first maj> = np
<subcat first head agreement person> = third
<subcat first head agreement number> = singular
<subcat rest> = end.

```

Word painted:

```

<maj> = v
<head form> = finite
<sem trans pred> = paint
<sem trans arg1> = <subcat rest first sem parameter>
<sem trans arg2> = <subcat first sem parameter>
<subcat first maj> = np
<subcat rest first maj> = np
<subcat rest rest> = end.

```

Word gave:

```

<maj> = v
<head form> = finite
<sem trans pred> = gave
<sem trans arg1> = <subcat rest rest first sem parameter>
<sem trans arg2> = <subcat rest first sem parameter>
<sem trans arg3> = <subcat first sem parameter>
<subcat first maj> = np
<subcat rest first maj> = np
<subcat rest rest first maj> = np
<subcat rest rest rest> = end.

```

Word every:

```

<maj> = det
<sem trans quant> = every
<sem trans range> = <subcat first sem trans>
<sem trans scope> = <sem fun_arg trans>
<sem parameter> = <subcat first sem parameter>
<subcat first maj> = n
<subcat rest> = end
<subcat first head agreement person> = third
<subcat first head agreement number> = singular.

```

Word a:

<maj> = det
 <sem trans quant> = exists
 <sem trans range> = <subcat first sem trans>
 <sem trans scope> = <sem fun_arg trans>
 <sem parameter> = <subcat first sem parameter>
 <subcat first maj> = n
 <subcat rest> = end
 <subcat first head agreement person> = third
 <subcat first head agreement number> = singular.

Word tom sawyer:

<maj> = np
 <head agreement gender> = masculine
 <head agreement person> = third
 <head agreement number> = singular
 <sem parameter> = tom
 <sem trans> = <sem fun_arg trans>
 <sem fun_arg gap> = <gap>.

Word fence:

<maj> = n
 <head agreement gender> = neuter
 <head agreement person> = third
 <head agreement number> = singular
 <sem trans pred> = fence
 <sem parameter> = <sem trans arg1>.

Word brush:

<maj> = n
 <head agreement gender> = neuter
 <head agreement person> = third
 <head agreement number> = singular
 <sem trans pred> = brush
 <sem parameter> = <sem trans arg1>.

Word boy:

<maj> = n
 <head agreement gender> = neuter
 <head agreement person> = third
 <head agreement number> = singular
 <sem trans pred> = boy
 <sem parameter> = <sem trans arg1>

Appendix B

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
DAG Unifier
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

d_union([FS1,R_List1],[FS2,R_List2],[OutFS,OutR_List]):-
    append(R_List1,R_List2,R_List), % make joint reentrancy
    aux_d_union(FS1,FS2,R_List,OutFS,OutR_List),!. % list

/* Three termination conditons */
aux_d_union([],FS2,R_List,FS2,R_List):-!.
aux_d_union(FS1,[],R_List,FS1,R_List):-!.
aux_d_union(FS,FS,R_List,FS,R_List):-!,
    atom(FS)

/* Path1's feature exists in Dag2 */
aux_d_union([[FE,FS1Val]|RestFS1],FS2,InR_List,
    [OutFS|RestFS],OutR_List):-
    remove([FE,FS2Val],FS2,RestFS2),!,
    aux_d_union(RestFS1,RestFS2,InR_List,RestFS,R_List1),
    match_values(FE,FS1Val,FS2Val,R_List1,OutFS,OutR_List).

/* Path1's feature does not exist in Dag2 */
aux_d_union([FS1|RestFS1],[FirstFS2|RestFS2],
    R_List,[FS1|OutFS],OutR_List):-
    aux_d_union(RestFS1,[FirstFS2|RestFS2],R_List,
    OutFS,OutR_List).

/* Path1 and Path2 both end in reentrant values that have
already been unified */
match_values(FE,FS1Var,FS2Var,R_List,[FE,FS1Var],R_List):-
    var(FS1Var),
    var(FS2Var),
    FS1Var == FS2Var,!. % variables have already been unified

/* Path1 and Path2 both end in reentrant values */
match_values(FE,FS1Var,FS2Var,R_List,[FE,FS1Var],
    [[FS1Var,ReentrantFS]|RestR_List]):-
    var(FS1Var),
    var(FS2Var),!,
        /* Find the reentrant values on R_List */
    feat_val_remove([FS1Var,FS1Val],R_List,R_List1),
    feat_val_remove([FS2Var,FS2Val],R_List1,R_List2),
    FS1Var = FS2Var,
    aux_d_union(FS1Val,FS2Val,R_List2,
    ReentrantFS,RestR_List). % Unify the reentrant values.

```

```

/* Path1 ends in a reentrant value, but Path2 does not */
match_values(FE,FS1Var,FS2Val,R_List,[FE,FS1Var],
             [[FS1Var,ReentrantFS]|RestR_List]) :-
    var(FS1Var),!,
    feat_val_remove([FS1Var,FS1Val],R_List,R_List1),
    aux_d_union(FS1Val,FS2Val,R_List1,ReentrantFS,RestR_List).

/* Path2 ends in a reentrant value but Path1 does not */
match_values(FE,FS1Val,FS2Var,R_List,[FE,FS2Var],
             [[FS2Var,ReentrantFS]|RestR_List]) :-
    var(FS2Var),!,
    feat_val_remove([FS2Var,FS2Val],R_List,R_List1),
    aux_d_union(FS1Val,FS2Val,R_List1,ReentrantFS,RestR_List).

/* Path1 and Path2 both end in non-reentrant values */
match_values(FE,FS1Val,FS2Val,R_List,[FE,OutFS],OutR_List):-
    aux_d_union(FS1Val,FS2Val,R_List,OutFS,OutR_List).

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% Path Value %%%%%%%%%%%%%%%
path_val(Path,[FS,R_List],[Copy_of_OutFS,NCopy_of_R_List]):-
    naive_path_val(Path,[FS,R_List],OutFS), % See section 3.4.1
    find_true_reentrancies([OutFS,R_List],
                           [Copy_of_OutFS,Copy_of_R_List],
                           TrueReentrancies),
    undo_reentrancies(Copy_of_R_List,NCopy_of_R_List,
                      TrueReentrancies).

/* undo_reentrancies TR = true reentrancies list. If a
reentrancy variable (RVar) is not on this list, the
reentrancy is 'undone' and then thrown away */

undo_reentrancies([],[],_TR). % Termination

/* In this case we retain the true reentrancy list */
undo_reentrancies([[RVar,FS]|RestReentrancies],
                  [[RVar,FS]|NRestReentrancies],TR):-
    var_member(RVar,TR),!,
    undo_reentrancies(RestReentrancies,NRestReentrancies,TR).

/* This (destructively) undoes the reentrancy. It's a good
thing we're working with a copy! */
undo_reentrancies([[FS,FS]|RestReentrancies],
                  NRestReentrancies,TR):-
    undo_reentrancies(RestReentrancies,NRestReentrancies,TR).

```

```

/* find_true_reentrancies(Dag,Copy_of_Dag,
                        List_of_variables_marking_true_reentrancies)
This finds all reentrancy variables that occur at least twice
and in the process copies the DAG.-- CFS = Copy of FS */
find_true_reentrancies([FS,R_List],[CFS,CR_List],TR):-
    true_reentrancies_in_FS(FS,CFS,Binding,TR1),
    true_reentrancies_in_R_List(R_List,CR_List,Binding,TR1,TR).

/* Initialize accumulator variables */
true_reentrancies_in_FS(FS,CFS,Binding,TR):-
    true_reentrancies_in_FS(FS,CFS,[],Binding,[],TR).
true_reentrancies_in_FS(A,A,Binding,Binding,TR,TR):-
    atom(A),!.

/* When a variable V is encountered, a new arbitrarily chosen
variable, V1, is introduced for the copy, and [V,V1] is added
to Binding to indicate that V's counterpart in the new copy
is V1. */
true_reentrancies_in_FS(V,V1,Binding,Binding,TR,TR1):-
    var(V),
    feat_val_member([V,V1],Binding),!,
    add_to(V1,TR,TR1). % adds V1 iff V1 is not already a member

/* Here we encounter a reentrancy variable for the first
time. We don't know yet if it marks a true reentrancy. */
true_reentrancies_in_FS(V,V1,Binding,[V,V1|Binding],
                        TR,TR):-
    var(V),!.

/* This is the recursive clause. The feature structure is
complex so we first break it down */
true_reentrancies_in_FS([F,V|Rest],[F,CV|CRest],
                        Binding,Binding2,TR,TR2):-
    true_reentrancies_in_FS(V,CV,Binding,Binding1,TR,TR1),
    true_reentrancies_in_FS(Rest,CRest,Binding1,Binding2,
                            TR1,TR2).

/* Find true reentrancies in the part of the reentrancy list
that is used */
true_reentrancies_in_R_List(R_List,[NVar,CFS|RestCR_List],
                            Binding,TR,TR2):-
    remove([RVar,FS],R_List,NR_List),
    feat_val_member([RVar,NVar],Binding),!, % RVar is used
    true_reentrancies_in_FS(FS,CFS,Binding,Binding1,TR,TR1),
    true_reentrancies_in_R_List(NR_List,RestCR_List,Binding1,
                                TR1,TR2).
true_reentrancies_in_R_List(_R,[],_Binding,TR,TR).

```

```
%% add item to list if the item is not already a member.
```

```
add_to(X,L,L):-
    var_member(X,L),!.
add_to(X,L,[X|L]).
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% Restriction %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
change_restructor(Paths):-
    retractall(restrict(_,_)),
    retractall(make_restructor(_,_)),
    assert((restrict(Dag,RestrictedDag):-
        get_vals(Paths,Dag,Vals),
        make_restructor(Vals,RestrictedDag))),
    assert_restrictions(Paths).
```

```
/* Find all the values at the ends of the paths */
get_vals(X_j,[FirstPath|RestPaths],Dag,[Val|RestVals):-
    naive_path_val([X_j|FirstPath],Dag,Val1),
    if(list(Val1),Val = [],Val = Val1),
    get_vals(X_j,RestPaths,Dag,RestVals).
get_vals(_X_j,[],_Dag,[]).
```

```
/* Make the clauses for 'Make_restructor' */
assert_restrictions(Paths):-
    make_selection(Paths,SelectedPaths),
    successively_combine(SelectedPaths,FS,Vars),
    assert((make_restructor(Vars,[[]|FS],[]))),
    fail.
assert_restrictions(_).
```

```
/* Nondeterministically pick a subset of paths that have
values other than [] at their ends */
make_selection([_F|R],[[]|R1):-
    make_selection(R,R1).
make_selection([F|R],[F|R1):-
    make_selection(R,R1).
make_selection([],[]).
```

```
successively_combine([],[],[]).
successively_combine([[]|RestPaths],CombinedPaths,
    [{}|RestVs):-!,
    successively_combine(RestPaths,CombinedPaths,RestVs).
```

```

successively_combine([FirstPath|RestPaths],
                     CombinedPaths, [Var|RestVars]):-
    successively_combine(RestPaths, InitialCombination,
                        RestVars),
    make_FS(FirstPath, Var, FS),
    combine(FS, InitialCombination, CombinedPaths).

/* 'make_FS' makes a feature structure from a path and a
value, e.g. make_FS([x0, head, form], finite,
                   [[x0, [[head, [[form, finite]]]]]]) */
make_FS([FirstFeature|RestFeatures], Val,
        [[FirstFeature, FFeatureValue]]):-
    make_FS(RestFeatures, Val, FFeatureValue).
make_FS([], Val, Val).

/* This is a very simply version of d_union that only unifies
feature structures with no reentrancies */
combine(X, _, _):- var(X), !, fail.
combine(X, [], X):- !, .
combine([X, FS], CombinedPaths,
        [[X, OutFS]|RestCombinedPaths]):-
    remove([X, FS2], CombinedPaths, RestCombinedPaths), !,
    nonvar(FS2),
    combine(FS1, FS2, OutFS).
combine([FS], CombinedPaths, [FS|CombinedPaths]).

combine(X, [], X).
combine([X, FS1], [[X, FS2]], [[X, OutFS]]):- !,
    combine(FS1, FS2, OutFS).
combine([X, FS1], [[Y, FS2]], [[X, FS1], [Y, FS2]]).

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% Subsumption %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

/* Null feature structure with any reentrancy subsumes
anything */
subsumes([], _, _).

subsumes([A, _], [A, _]):- % An atom subsumes an identical atom.
    atom(A).

subsumes([[FE, FS1Val]|RestFS1, R_List1], [FS2, R_List2]):-
    nonvar(FS1Val), !, % It doesn't matter whether or not Dag2
    value(FE, [FS2, R_List2], FS2Val), % has a reentrancy here
    subsumes([FS1Val, R_List1], [FS2Val, R_List2]),
    subsumes([RestFS1, R_List1], [FS2, R_List2]).

```

```

subsumes([[FE,FS1Var]|RestFS1],R_List1],[FS2,R_List2]):-
  member([FE,FS2Var],FS2),
  var(FS2Var), % If Dag1 has a reentrancy then Dag2 must have
  feat_val_member([FS1Var,FS1Val],R_List1), % one in the same
  feat_val_member([FS2Var,FS2Val],R_List2), % place.
  subsumes([FS1Val,R_List1],[FS2Val,R_List2]),
  subsumes([RestFS1,R_List1],[FS2,R_List2]).\

```

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
Auxiliary Predicates
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

```

/* var_member(Member,List_of_Variables).Used in Path Value */

```

```

var_member(X,[F|_]):-

```

```

  X == F,!.

```

```

var_member(X,[_|R]):-

```

```

  var_member(X,R).

```

```

/* feat_val_member for checking membership on reentrancy
lists Used in Path Value and Subsumption */

```

```

feat_val_member([F,V],[[F1,V]|_]):- F == F1.

```

```

feat_val_member(X,[_H|T]):- feat_val_member(X,T).

```

```

/* feat_val_remove for removing members from reentrancy
lists. Used in DAG Unifier */

```

```

feat_val_remove([F,V],[[F1,V]|Xs],Xs):-

```

```

  F == F1.

```

```

feat_val_remove(X,[Y|Ys],[Y|Zs]):- feat_val_remove(X,Ys,Zs).

```

```

/* Remove from any kind of list. Used by DAG Unifier */

```

```

remove(X,[X|Xs],Xs).

```

```

remove(X,[Y|Ys],[Y|Zs]):- remove(X,Ys,Zs).

```

```

/* Used by Path Value and Restriction */

```

```

list([]).

```

```

list([_First|_Rest]). % assume that _Rest is a list.

```


'C-COMMAND' AND THE PHONOLOGY-SYNTAX INTERFACE IN CILUBA'

Nkonko Mudipanu Kamwangamalu

This paper deals with the interaction of phonology and syntax in relative clauses and *wh*-constructions in Ciluba'. Unlike other Bantu languages Ciluba does not have an overt relative clause marker. This raises the question of how relative clauses are formed in Ciluba, and how such clauses can be distinguished from non-relative clauses, especially where both relative clauses and non-relative clauses have the same surface structure. The paper addresses these questions within the Government and Binding framework (Chomsky 1981). It is observed that although they do not contain overt relative pronouns or markers, relative structures are similar to structures with fronted interrogative pronouns, just as in many other languages: Both in relative structures and in structures with moved interrogatives, move-alpha brings about the loss of mutual c-command between the verb and the preceding constituent, along with consequent verbal tone changes. In the case of relative structures, the resulting tone changes may be viewed as an indirect marker of relative clause formation. However, since the same changes take place in structures with fronted *wh*-words, the tonal changes cannot be considered as functioning primarily as relative markers. At best, it could be argued that tone change secondarily functions as something like a signal of relative clause formation in Ciluba.

1. Introduction

The question of how phonology and syntax interface has received considerable attention in the past twenty years or so, as can be seen from an increasing number of studies devoted to this topic, such as Hetzron 1972, Clements 1978, Kaisse 1981, Pullum and Zwicky 1983, Sadock 1983, Plank 1984, Selkirk 1984, Klavans 1985, Zwicky 1985, Kenstowicz 1987.

One of the concerns in most such studies has been to determine whether the application of certain syntactic rules is conditioned by phonological rules, or whether what goes on in phonology has no relation whatsoever to syntax and vice versa. The view that syntax is unable to influence phonology and vice versa is sometimes referred to as the principle of phonology-free syntax (Pullum & Zwicky 1983), or as the principle of syntax-free phonology in the sense of Selkirk 1984.

Assuming that the principle of phonology-free syntax is correct, the question is how does one account for facts such as those presented in the Ciluba structures in (1) and (2).

- (1) a. Múntú úvwá múshípà ntámbwé 'The man killed the lion'
 b. Múntú úvwá múshípà ntámbwé 'The man who killed the lion...'
- (2) a. Ngándù úvwá múshípà mwâná 'The alligator killed the child'
 b. Ngándù úvwá múshípà mwâná 'The alligator that killed the child...'

In terms of the order of words the structures in (1) are identical, and so are the structures in (2). The only thing that distinguishes the a-structures from the b-structures is the tonal pattern on the auxiliary verb *u-vwa*. The auxiliary verb stem, *-vwa*, has a high tone in both (1) and (2). However, its prefix *u-* has a low tone in the a-structures, while in the b-structures it has a high tone.

The question that is worth raising here is whether tones or phonology for that matter condition the application of the rule of relativization in Ciluba; and if not, why it is that the b-structures of (1)-(2) are interpreted as relative structures.

In this paper I shall argue that although in surface order the a-structures in (1)-(2) are identical to the corresponding b-structures, their respective underlying hierarchical syntactic structures are different. The hypothesis of this paper is that the verbal tone changes in the b-structures are syntactically conditioned. It is important to note that similar verbal tone changes obtain in interrogative *wh*-structures in which a *wh*-word has been fronted. I shall present two cases from Ciluba which provide support for the hypothesis made here. The first has to do with the formation of Ciluba relatives, and the second with the fronting of *wh*-words. In order to understand the discussion of the two cases, a background on Ciluba tone sandhi is needed. The discussion will be limited to verbal tones, since I will be dealing with verbal tone changes in relatives and interrogatives.

2. The tones of the verb

Ciluba verbs can be grouped in two main categories: (a) verbs whose stems (mono or polysyllabic) have a high tone, and (b) verbs whose stems have a low tone. The first category of verbs will be referred to as high tone stem (HTS) verbs, and the second as low tone stem (LTS) verbs. The examples in (3) illustrate the first category, and those in (4) the second. Note that in both categories, if the verb is in the infinitive form, the prefix and the final vowel suffix always bear a high tone. In the data presented below and throughout this paper / [acute accent] stands for a high tone, low tones are unmarked.

(3) High-Tone Stems (HTS)

Prefix	Stem	Gloss
kú-	shíp -á	'to kill'
kú-	lóng -á	'to learn'
kú-	ákáj -á	'to fix'

(4) Low-Tone Stems (LTS)

Prefix	Stem	Gloss
kú-	tum- á	'to send'
kú-	mon- á	'to see'
kú-	peesh-á	'to give'

The verbs in (3) and (4) can be followed by suffixes. However, affixation has no effect on the tone of the stem. That is, if the stem is H/L, it will remain H/L regardless of the number of suffixes affixed to it, as the HTS verbs in (5) and the LTS verbs in (6) illustrate. In both (5) and (6), -il- 'for' is an applied suffix; -ish- (or -esh-) 'cause to' is a causative suffix; and -angan- 'each other' is a reciprocal suffix.

(5) Extended HTS

Kú -shíp- á	'to kill'	Kú-shíp-il-á	Kú-shíp-il-ángán-á
Kú -lóng- á	'to learn'	Kú-lóng-él-á	Kú-lóng-él-ángán-á
Kú -ákáj- á	'to fix'	Kú-ákáj-il-á	Kú-ákáj-il-ángán-á

(6) Extended LTS

Kú - tum -á	'to send'	Kú-tum-ish-á	Kú-tum-ish-ángán-á
Kú - mon -á	'to see'	Kú-mon-esh-á	Kú-mon-esh-ángán-á
Kú -peesh-á	'to give'	Kú-peesh-ish-á	Kú-peesh-ish-ángán-á

I shall assume that in (5) and (6) each extension suffix has an underlying HT. This is because whether or not the material that precedes the suffix (the verb stem) or follows it (the final vowel) is present, the suffix always bears a high tone. Note that the stems in both (5) and (6) keep their initial tone, HT for the former, and low tone (LT) for the latter.

However, in both cases the tone patterns look different when the verb is used in a given tense/aspect or a phrasal context. For example, consider the tonal contrast in the case of past perfect and relative structures, as shown in (7) for HTS verbs, and in (8) for LTS verbs. In these paradigms -vwa is a past form of the auxiliary verb *Kwikala* 'to be'.

(7) (LTS)	<u>Infinitive</u>	<u>Past Perfect</u>	<u>Relative structures</u>
Kú-tum-á	'to send'	ba-vwá bá-tum-á	ba-vwa bá-tum-á
Kú-mon-á	' " see'	ba-vwá bá-mon-á	ba-vwa bá-mon-á
Kú-peesh-á	' "give'	ba-vwá bá-peesh-á	ba-vwa bá-peesh-á
(8) (HTS)	<u>Infinitive</u>	<u>Past Perfect</u>	<u>Relative structures</u>
Kú-shíp-á	'to kill'	ba-vwá bá-shíp-a	ba-vwa bá-shípa
Kú-lóng-á	' " learn'	ba-vwá bá-lóng-a	ba-vwa bá-lóngá
Kú-ákáj-á	' " fix'	ba-vwá bá-ákáj-a	ba-vwa bá-ákája

In (7), the stems remain low. Similarly, the HT stems of (8) remain high. The main concern here is explaining the alternation of HT and LT on the auxiliary -vwa in the past perfect and relative structures. In the past perfect of either HTS or LTS verbs in both (7) and (8) the auxiliary -vwa is high-toned. However, in the relative structures, -vwa is low-toned. Since in Ciluba the auxiliary -vwa is usually high-toned, the fact that it bears a low tone in relative structures can be accounted for as follows:

(9) In a relative structure

- (i) the HT of the auxiliary lowers after LT, except in the third person singular.²
- (ii) In the third person singular the auxiliary prefix changes its original low tone to high tone.

(9i) would be applicable to the data of (7) and (8), while (9ii) would account for data such as those presented earlier in (1) and (2). Whether one is dealing with the data in (7) and (8) or with the data in (1) and (2), it seems that the generalizations of (9) apply under certain syntactic conditions. In the remainder of this paper I shall examine those conditions.

3.0 Ciluba Relative Structures

Unlike languages such as English, French, or Swahili, Ciluba does not have an 'overt' relative clause marker, a fact which makes relativization in Ciluba a very interesting topic.

To make the point clearer, let me compare the English structures in (10), the Swahili structures in (11), and their corresponding Ciluba counterparts in (1), repeated here as (12).

- (10) a. The man killed the lion.
- b. The man **who** killed the lion...

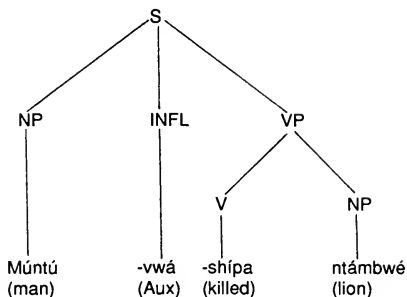
- (11) a. Mtu a-me-mu-u-a simba
man Ag-PAST-OP-kill lion
'The man killed the lion.'
- b. Mtu **amba**-ye a-me-mu-u-a simba
man RM-Pron. Ag-PAST-OP-kill lion
'The man **who** killed the lion...'
- (12) a. Múntú u-vwá mú-shíp-a ntámbwé
man Ag-PAST-kill lion
'The man killed the lion.'
- b. Múntú ú-vwá mú-shíp-a ntámbwé
man Ag-PST-kill lion
'The man **who** killed the lion...'

In (10b), the English Wh-word who signals that the subject man is relativized, and so does the Swahili relative structure marker amba in (11b). As for Ciluba, the only thing that distinguishes (12a) from (12b) is the tone pattern on the auxiliary u-vwá: In (12a) the verb u-vwá displays a low tone followed by a high tone, while in (12b) it displays a sequence of high tones. Given that both (12a) and (12b) have the same surface constituent structure, the question is why is it that (12b), but not (12a), is interpreted as a relative structure? I shall discuss this question in the following section by examining various cases of relativization in Ciluba, including subject relativization, direct object relativization, and indirect object relativization. I shall show that what we are dealing with is the syntactic conditioning (in terms of c-command) of a phonological rule. Since in this particular case the auxiliary form involved is the third person singular, u-vwá, I shall argue that the rule which applies in (12b) is (9ii), whereby the auxiliary verb prefix u- changes its original low tone to a high tone.

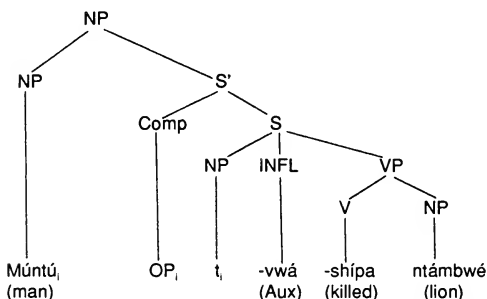
3.1 Subject (SU) Relativization

In an attempt to address the question raised in the preceding section with regard to the structures of (12a) and (12b), I shall argue that those structures differ from one another not simply because of the verbal tone difference. Rather, I suggest that the tone difference is a result of the difference between the underlying syntactic structures of (12a) and (12b). It is this syntactic structural difference between (12a) and (12b) that creates an environment for the application of (9ii) in the surface syntactic structure of (12b). For reasons that will become clearer later I shall assume that the tones of the auxiliary u-vwá in (12a) are basic, while those in (12b) are derived. I propose the S-structure diagrammed in (13a) for (12a), and the S-structure in (13b) for (12b).

- (13) a. Múntú uvwá múshípa ntámbwé
'The man killed the lion.'



- b. Múntú úvwá múshípa ntámbwé
'The man who killed the lion...'



In order to explain the difference between (13a) and (13b) I shall, for the moment, use the concept of 'c-command' loosely, reserving its definition for later. A closer look at the two tree-diagrams in (13) reveals two things: In (13a) the NP Muntu c-commands and is sister of INFL u-vwa. In (13b), however, muntu 'man' does c-command INFL u-vwa but is not sister of the latter. In other words, in (13a) muntu and INFL u-vwa c-command each other because they are dominated by the same node, S. However, in (13b) the

same NP and INFL do not c-command each other due to the intervening maximal projection, S'.

The fact that in (13b) muntu and INFL u-vwa are not sisters creates an environment for the application of (9ii) in the surface syntactic structure of (12b). What is important here is that the only syntactic information that the generalization of (9ii) is sensitive to is the hierarchical constituent structure of (12b) as opposed to that of (12a). In this particular case the syntactic information is the c-command relation which does not hold mutually between muntu and INFL uvwa in (12b), but holds mutually between the two in (12a), as the tree diagrams in (13b) and (13a) show. It seems that move-alpha and loss of mutual c-command relation between the subject NP and the VP node in (13b) creates an environment for the application of the Ciluba sandhi rules given in (9ii), whereby the auxiliary verb prefix changes its original low tone to high tone.

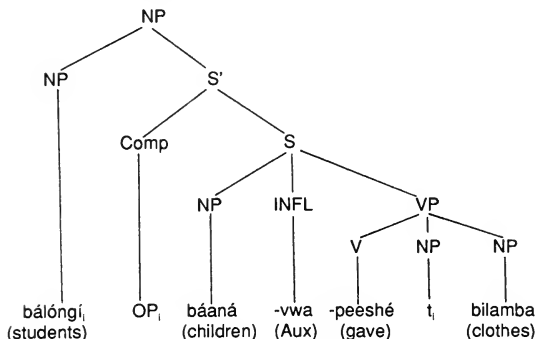
The facts discussed here with respect to subject (SU) relativization in (12b) are also attested to in structures where a direct object (DO) or an indirect object (IO) is relativized, as will be shown below.

3.2 DO and IO relativization

Consider the structures in (14) below. (14b) is a case of DO relativization, whereas (14c) is a case of IO relativization. In either case the relativized NP is put in boldface. (14a) is the corresponding non-relative structure. Note that in (14a) the auxiliary -vwa follows the logical subject of the clause, baana 'children', while in (14b) and (14c) it precedes it. It seems that Ciluba has a rule whereby the auxiliary reverses its position with the logical subject in all relatives, except in subject relativization. When the rule applies, the auxiliary agrees not with the logical subject but rather with the relativized noun. A case in point is (14c), where the logical subject, baana belongs to noun class 2, while the relativized noun, bilamba 'clothes', belongs to class 8. And since in this case the auxiliary must agree with the relativized noun, -vwa in (14c) receives the class 8 prefix bi- for agreement with bilamba.

- (14) a. **Báaná** ba-vwá bá-peeshé bálóngí bílamba.
children Ag-Aux Ag-give students clothes
'The children gave the students clothes'
- b. **Bálóngí**, ba-vwa báaná bá-peeshé t, bílamba
students Ag-Aux children Ag-give clothes
'The students whom the children gave clothes to...'
- c. **Bílamba**, bi-vwa báaná bá-peeshé bálóngí t,
clothes Ag-Aux children Ag-give students
'The clothes that the children gave the students...'

- b. **Bálongí**, ba-vwa báaná bá-peeshé t_i bilamba
The students whom the children gave clothes



While in (15a) both balongi and -peesha c-command each other, in (15b) only balongi c-commands -peesha but the latter does not c-command the former. This lack of mutual c-command is the triggering syntactic conditioning for the phrasal phonological rule given in (9i), which applies to the surface syntactic structure of (14b). The application of a rule such as this results in the lowering of the underlying high tone of the auxiliary -vwa in (14b). As a result, (14b) but not (14a) is interpreted as a relative structure.

Similar facts obtain for the structure of (14c), where the DO bilamba 'clothes' is relativized. The syntactic tree of (16) below is illustrative. It shows that the NP bilamba has moved to the subject position in the higher clause, and like balongi in (15b), bilamba in (16) has left a trace behind, which appears in the position from which it has been moved. bilamba c-commands -peesha, but the latter does not c-command bilamba. The remainder of the syntactic tree is the same as in (15b).

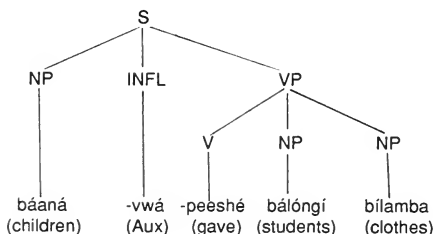
In the surface structure of (14c) the auxiliary -vwa receives the prefix bi- for agreement with the subject NP bi-lamba, while in (14b) -vwa receives ba- for agreement with the subject NP ba-longi. However, as can be seen in the surface structures of (14c) and (14b), the tone of the auxiliary -vwa in both cases is low in accordance with rule (9i).

The relevant question regarding the data in (14) is why does the auxiliary verb -vwa, which is usually high-toned as in (14a), display a low tone in the structures of (14b) and (14c)? In an attempt to answer this question, I propose to consider, first, the syntactic trees of (15a) and (15b) below for the structures in (14a) and (14b), respectively.

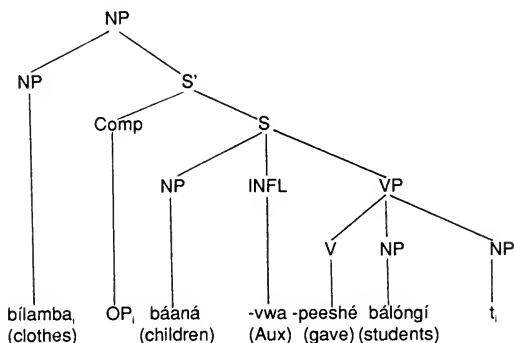
In (15a) both the IO balongi 'student' and the DO bilamba 'clothes' are dominated by the same phrasal node, the VP bapeeshe balongi bilamba 'gave the student clothes'. In other words, the NP balongi and the NP bilamba c-command each other in (15a). In addition, c-command holds also between both NPs and the verb -peesha, since the latter is dominated by the same phrasal node that dominates the two NPs, the VP bapeeshe balongi bilamba. Similarly, in (15a) the NP baana 'children, INFL ba-vwa, and the VP bapeeshe balongi bilamba c-command each other because they are dominated by the same node, S. Note that in the surface structure of (15a) ba-vwa has a low tone followed by a high tone.

In (15b), however, ba-vwa displays a sequence of low tones. Also, in the tree of (15b), the verb -peesha c-commands only the NP bilamba, but does not c-command balongi. Instead, balongi has moved to the subject position, and in the process has left a trace coindexed with it in the position from which it has been extracted, as the tree in (15b) shows. The fact that balongi appears in the subject position in (15b) while in (15a) it is in the indirect object position shows that the syntactic structure of (15b) must be different from that of (15a).

- (15) a. Báaná ba-vwá bá-peeshé bálóngí bílamba.
'The children gave the students clothes.'



- (16) **Bílamba**, bi-vwa báaná bápeeshé bálóngí t_i (same as (14c))
 'The clothes that the children gave the students.'



To summarize: I have used the concept c-command (cf. Chomsky 1981) in order to account for the difference between the verbal tone patterns in Ciluba relatives and non-relatives. I have shown that whenever move-alpha applies in SU, DO, or IO relativization, it results in loss of mutual c-command between the relativized NP and the verb of the structure involved. It is under this syntactic condition that the phonological phrasal rules in (9) apply.

The syntactic conditioning (in terms of c-command) of the rules in (9) is similar to the situation described in Manzini 1983 regarding liaison in French. Manzini's hypothesis about liaison in French is presented in the following section. It is observed that Manzini's hypothesis provides the basis for a proper analysis of Ciluba relativization, and that the latter in turn furnishes further support for Manzini's hypothesis.

4. Liaison in French

Manzini (1983:8) observes that in French, liaison is possible with certain words. Manzini suggests the rule presented in (17) below, where L stands for "belonging to some class L", and V for "vowel". The rule in (17) says that an obstruent is deleted at the end of a word α unless a word β follows which begins with a vowel and α itself is an L word (Manzini 1983:8).

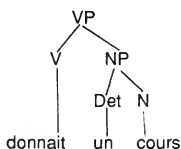
(17) [-son] ----> β / α _____ unless

$\frac{\beta}{L}$ V

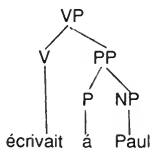
The data that Manzini refers to in connection with rule (17) include cases such as (18) on the one hand, and (19) on the other. In the examples given below ^ stands for liaison; and / indicates that liaison is not possible.

Let me observe that prior to liaison, words such as donnait and un in (18a) can be produced as two separate words, and so can écrivait and a in (18b). However, when liaison applies each pair is produced as a single word, as shown by the liaison sign, ^. In cases where liaison is impossible, as in (19), words such as lunettes and a cannot be produced as one single unit, neither can lunettes and étaient in (19b). The question is why is it that liaison obtains in the structures of (18) but not in (19)?

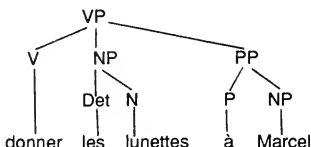
(18) a. donnait^un cours 'was teaching'



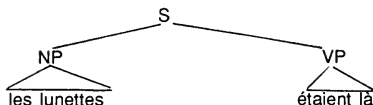
b. écrivait^à Paul 'was writing to Paul'



(19) a. Donner les lunettes/à Marcel 'give glasses to Marcel'



b. Les lunettes étaient là
'The glasses were there'



Manzini (1983:3) suggests that a possible hypothesis is a relation of c-command which is satisfied in (18) but not in (19). In other words, for any two words involved in the 'unless' provision of (17) a relation of c-command holds, as in (20), with c-command defined as in (21) (Manzini 1983:3).

(20) In α [β]

α and β c-command each other (obligatory application)

α c-commands β (optional application of liaison)

(21) α c-commands β iff neither one dominates the other and the first phrasal node which dominates α dominates β also.

Manzini explains that liaison obtains in (18a) because of the c-command relation that holds between donnait and un. That is, the first phrasal node which dominates donnait, namely VP, also dominates un, hence donnait c-commands un. However, in (19a) the NP lunettes does not c-command the preposition à, since the first phrasal node which dominates lunettes, viz. NP, does not dominate à (Manzini 1983:3).

As observed, Manzini's hypothesis is corroborated by the facts discussed with respect to Ciluba SU, DO, and IO relativization. Note, however, that the rules that Manzini proposes in (20) and (21) for liaison in French work in the reverse order for Ciluba relativization. That is, while in French, liaison obtains when c-command holds between the elements involved, the Ciluba facts suggest that phrasal sandhi rules here apply only in structures where no

'mutual c-command' holds between the verb and the subject NP on the one hand, or between the verb and its object or one of its object NPs, on the other. Thus for Ciluba phrasal sandhi rules such as (9) to apply in the surface syntactic structure of (12b), for example, the statements of (20) and (21) need to be modified as in (22) and (23), respectively, with 'mutual c-command' defined as in (23).

(22) In α] [β : where α stands for lexical category V, and β for lexical category N,

α does not c-command β , but
 β c-commands α , hence there is 'no mutual c-command' between α and β

(23) α and β mutually c-command each other iff

- i) neither one dominates the other;
- ii) the first phrasal node which dominates α dominates β also;
- iii) α c-commands β and β c-commands α ;

c-command: α c-commands β and β c-commands α
 iff every maximal projection
 dominating α also dominates β
 (Sells 1985:39).

Stated informally, the conditions in (22) and (23) simply mean that a lexical category, V, does not c-command another lexical category, N, if N and V are not dominated by the same first phrasal node. In the remainder of this paper I shall use the term 'no mutual c-command' to refer to every case where an NP c-commands a verb but the verb does not c-command the NP.

The statements of (22) and (23) are borne out by the facts discussed earlier concerning Ciluba SU relativization, IO relativization, and DO relativization. Further evidence for these statements comes from data on Ciluba wh-structures, which I will discuss in the next section.

4. WH-Constructions

Ciluba has many ways of expressing interrogation. These include the use of intonation, body language, and wh-words. Here I shall be concerned with wh-structures. Ciluba wh-structures are sometimes marked by the question particle [-epi]. This particle is used with subject/verb agreement prefixes corresponding to all Ciluba noun class prefixes. Expressions in which -epi occurs include u-epi 'where is he/it?', and ba/i-epi 'where are they (e.g. men/houses)?'.

The question marker relevant for the subsequent discussion is *-ni*, a particle whose meaning likewise depends on the prefix with which it combines. For example, *Ngani/bangani* 'who' is used for questions that refer to human beings, *Cini/bingani* 'what' for questions that refer to non-human beings, and *Kuni/kwepi* 'where' for questions that refer to location. The structures in (24)-(26) are illustrative. The a-structures are affirmative statements; the corresponding questions are given in the b-structures and the c-structures.

- (24) a. Báana ba-vwá bá-moná bīvi
children Ag-Aux Ag-see thieves
'The children saw the thieves.'
- b. Báaná ba-vwá bá-moná **BÁNGÁNI?**
'The children saw **WHO?**'
- c. **BÁngáni**, bavwa báaná bámoná t,
'**WHO** did the children see?'
- (25) a. Báaná ba-vwá bá-moná ntámbwé
Children Ag-Aux Ag-see lion
'The children saw the lion'
- b. Báaná ba-vwá bá-moná **CÍNI?**
'The children saw **WHAT?**'
- c. **CÍNI**, ci-vwa báaná bámoná t,
'**WHAT** did the children see?'
- (26) a. Báaná ba-vwá ba-lóngá kú Chicago
children Ag-Aux Ag-go to school to Chicago
'The children went to school in Chicago'
- b. Báaná ba-vwá ba-lóngá **KÚNI/KWÉPI?**
'The children went to school **WHERE?**'
- c. **KÚNI/KWÉPI**, ku-vwa báaná ba-lóngá t,
'**WHERE** did the children go to school?'

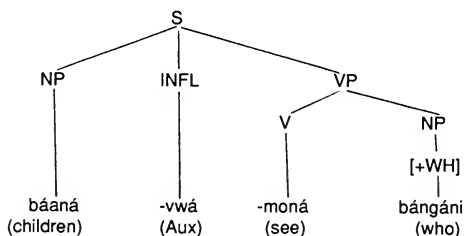
Note that in Ciluba a WH-word can be left in situ as in the b-structures, or it can be fronted via move-alpha to the subject position, as can be seen in the c-structures. However, if movement occurs, the WH-word not only leaves behind a trace that is syntactically bound with it, but it also triggers verbal tone changes in the structures involved, as the c-structures of (24)-(26) show. Note further that the rule of auxiliary verb/logical subject inversion referred to earlier with respect to the data in (14) applies also in the c-structures of (24)-(26). By this rule, the auxiliary reverses its position with the logical subject of the structure such that the auxiliary agrees with the derived subject rather than with the logical subject. This explains why in (26c), for example, the

auxiliary agrees with the moved wh-word, *ku-ni/ku-epi* 'where' rather than with the logical subject, *baana* 'children'.

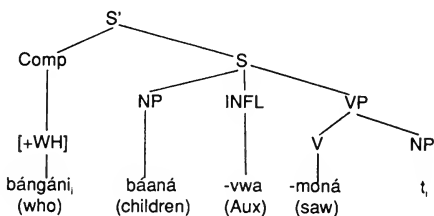
In the structures in the a and b versions of (24)-(26), the auxiliary *-vwa* has a high tone. In the c-structures, however, it has a low tone. The tonal alternation on the auxiliary *-vwa* in (24)-(26) is of the same nature as the one in the relative structures. Therefore, I will again propose that in the c-structures of (24)-(26) the auxiliary *-vwa* displays a low tone as a result of move-alpha and loss of mutual c-command relation between the verb and the moved Wh-word.

In order to account for the occurrence of the low tone on *-vwa* in the c-structures of (24)-(26), I propose in (27a, b) below the S-structures for (24b, c). Note that the remaining structures, viz. (25) and (26) can be accounted for in the same fashion by replacing the lexical items of (27) with relevant lexical items from the corresponding structures in (25) and (26).

- (27) a. Báaná bavwá bámoná **BÁNGÁNI**
'The children saw who?'



- b. **BÁNGÁNI**_i bavwa báaná bámoná t_i
'Who did the children see?'



The concept that I have been referring to thus far, mutual c-command, can be used also here to explain the difference between (27a) and (27b). In (27a) the verb -mona and the wh-word bangani c-command each other because they are dominated by the same node, the VP bamona bangani 'saw who'. However, there is no mutual c-command relation between the two in (27b), since the first phrasal node which dominates the verb -mona, VP, does not also dominate the wh-word bangani. Instead, in (27b) the wh-word bangani has moved to Comp. In the process the moved wh-word has left under the VP node a trace, *t*, which is coindexed with it. The facts adduced here show that the hierarchical syntactic structure of (27b) is not identical to the hierarchical syntactic structure of (27a). In (27b), where wh-movement has occurred, that difference is reflected by the tone change on the auxiliary -ywa, as can be seen in (24b). And the tone change must be accounted for by a sandhi rule similar to (9i), which is sensitive to the absence of mutual c-command between the verb and the preceding NP.

We are now in a position where we can provide a more systematic account of Ciluba relative structures. Although they do not contain overt relative pronouns or markers, syntactically they are similar to structures with fronted interrogative pronouns, just as in many other languages: Both in relative structures and in structures with fronted interrogatives, move-alpha brings about the loss of mutual c-command between the verb and the preceding constituent. A syntactic consequence is that the verb agrees with the initial constituent which may be different from the logical subject. On the phonological level, the lack of mutual c-command triggers tonal sandhi rules. In the case of relative structures, the resulting tone changes may be viewed as an indirect marker of relative clause formation. However, since the same changes take place in structures with fronted wh-words, the tonal changes cannot be considered as functioning primarily as relative markers. At best, it could be argued that tone change functions secondarily as something like a signal of relative clause formation.

5.0 Alternative approaches

5.1 Relative clauses and feature marking

One way to approach the data on Ciluba relatives and moved interrogatives would be to assume that there exist in Ciluba bundles of syntactic features such as [+/-Relative], which mark relative structures as [+Relative] and non-relative as [-Relative]. So, if a structure is marked with the feature [+Relative], then one would expect a tone change on the verb as opposed to the tone pattern that the same verb would have in non-relative structures. In this approach, the grammar of Ciluba would have to have many bundles of such features in order to account for each individual structure, whether relative, interrogative, or others. The problem with this approach is

that it does account for all the facts. For as the discussion of interrogatives has shown, it is not sufficient for a structure to be marked as [+ interrogative] to undergo verbal tone sandhi. Rather, it is the application of move-alpha and the resulting absence of mutual c-command that triggers the tone sandhi.

5.2 Ciluba tone reversal

Another approach that may at first appear consistent with the data discussed in this paper is the 'tone reversal approach' proposed in Maddieson 1976. Tone reversal is a phenomenon by which tones in Ciluba have been reversed from their initial value in Proto-Bantu. That is, Proto-Bantu high tone has become Ciluba low tone, and Proto-Bantu low tone has become Ciluba high tone (Meeussen 1967, 1971; Van Spaandonck 1971, Maddieson 1976).

In an earlier publication on tone reversal in Ciluba, Maddieson (1976) suggests that the verbal tone change in Ciluba relative structures can be explained as originating from the loss of an augment that Ciluba had in its initial stage (e.g. Du Bois 1970). Under this approach it is assumed that in its initial or pre-Ciluba stage, Ciluba must have had an augment, i.e. a pre-prefix of some sort, generally a vowel used with both nouns and verbs (Maddieson 1976:157). The augment must have been high-toned, as can be inferred from the derivations given in (30) and (31) below. However, the high tone of the augment changed to a low tone as a result of the aforementioned tone reversal.

Maddieson explains that since Ciluba no longer has an augment, the augment must have been deleted by a contraction rule in pre-Ciluba. In the process, the augment left a floating low tone on the tonal tier of Ciluba verbs and nouns. Maddieson concludes that after tone reversal and augment deletion (in that order), the resulting floating low tone must have spread rightward onto the adjacent tone bearing unit, usually a vowel. Maddieson (1976:161) gives the rules in (29) which he says can account for the sequences in (28). He postulates the sequences in (28) as the underlying tonal structure of verbs in Ciluba relative structures. Maddieson does not define the contraction rule formally because, in his words, doing so would have created problems that were beyond the scope of his paper. As a consequence, in the examples below, I will have to fudge a little as far as the application of this rule is concerned.

(28)	augment	prefix	verb stem	final vowel
	L	H	{H} {L}	L

- (29) a. HL {L}-----> HH {L}
 {#} {#}
- b. LH {H} -----> LL {H}
 {#} {#}
- c. Contraction (e.g. H L L ----> H L)
 VCVCV CVCV

Some of the few cases that Maddieson (1976:161) gives in which the rules stated in (29) apply include the examples given in (30) and (31), below.

Pre-CilubaModern Ciluba

- (30) *abatoma -----> batuma 'they who sent'

Derivation (Maddieson 1976:161):

abatoma -----> batoma (augment deletion)

L H H L -----> L L H L
 | | | |
 L L H H (tone-spreading)
 | | | /
 L L H (contraction)

- (31) *abadema -----> badima 'they who cultivate'

Derivation (Maddieson, *ibid.*)

abadema -----> badima (augment deletion)

L H L L -----> L H L L
 | | | |
 L H H L (tone-spreading)
 | | | |
 L H H H (tone-spreading)
 | | | /
 L H H (contraction)

Maddieson's approach may appear to account nicely for data such as (30) and (31). However, the data under consideration present only part of the problem that Ciluba relative structures raise. First, let us consider again the

show that also in relative structures without auxiliary the verb displays a tonal pattern different from the pattern in non-relative structures. Thus, u-aka-ship-a in the non-relative structure in (34a) displays a sequence of low tones followed by high tones, while in the relative structure in (34b) it shows a sequence of high tones followed by low tones. Examples like these show that what is going on in terms of tone alternation is not tone lowering, which Maddieson's account would predict, but a tone reversal.

Finally, there is no evidence internal to Ciluba which shows that in its initial stage the language had an augment, as Maddieson suggests. The fact that the augment is used in related languages does not necessarily imply that Ciluba also had an augment at some stage in its development. Furthermore, if one holds as a matter of theoretical principle -- as do, for example, Pullum and Zwicky (1975) and Zwicky and Pullum (1983), Zwicky (1985) -- that no (language-specific and rule-specific) conditions on the applicability of syntactic rules in any language may make reference to phonological features (e.g. Plank 1984:330-331), then reference to a ghost augment in the formation of relatives in Ciluba must appear suspect.

The foregoing discussion shows that Maddieson's proposal is less viable than the proposal I have suggested in this paper because it cannot handle the facts about Ciluba relatives and moved interrogatives. In my proposal those facts can properly be accounted for if one refers to concepts such as 'mutual c-command', as defined in (23), which allow us to distinguish Ciluba relatives from non-relatives, and to distinguish wh-structures in which wh-fronting has applied from those in which it has not.

6. Conclusion

This paper has been concerned with the following questions:

- (a) How are relative clauses formed in Ciluba?
- (b) How can Ciluba relative clauses be distinguished from non-relative clauses?
- (c) Why is it that in Ciluba the verb of a relative clause usually displays a tone pattern different from the tone pattern it has in non-relative clauses, even though such clauses have the same surface constituent structure as relative clauses?

The paper has addressed these questions by examining various cases of relativization in Ciluba, including SU, DO and IO relativization. It was argued that Ciluba relative clauses are formed by move-alpha, which results in loss of mutual c-command relation between the elements involved and consequent verbal tone changes. The verbal tone changes obtain by applying the phrasal sandhi rules stated in (9). Such rules, I have argued, are syntactically conditioned and apply only in structures where 'mutual c-

command', as defined in (23), does not hold between the subject NP and the VP, nor between the verb and its object (or one of its object) NP(s). These conclusions are further supported by the behavior of moved interrogatives.

7. Theoretical Implications.

Earlier in this paper the question was raised of whether the principle of phonology-free syntax (e.g. Pullum and Zwicky 1975, 1983) is correct, and if it is, how does one explain the fact that in Ciluba, syntactic phenomena such as relativization are on the surface more visible in phonology rather than in syntax? This paper has shown that, as in many other languages (e.g. Kaisse 1977, 1981, Plank 1984, Kenstowic 1987), it is possible to maintain that syntax is independent of phonology, but that phonological rules may be sensitive to syntax. In fact, the tonal sandhi rules in Ciluba relative structures seem to be exclusively triggered by a syntactic factor, namely the absence of mutual c-command between the verb and the preceding constituent.

NOTES

¹ An earlier version of this paper was presented at the 19th Annual Conference on African Linguistics, Boston University, Boston, Massachusetts, April 14-17, 1988. I would like to express my gratitude to Hans Henrich Hock, and to an anonymous SLS reviewer for their insightful comments and suggestions. I also acknowledge with gratitude the comments and suggestions of my colleague, Laura Downing, on the pre-publication version of this paper. Any remaining errors are, of course, mine alone.

¹ Ciluba is one of the four national languages spoken in the Republic of Zaire. The other three languages include Kikongo, Lingala, and Swahili.

² The two rules given in (9) are needed to account for the behavior of Ciluba relatives, as the additional data presented below also suggest. The data show that in relative clauses, -vwa in the third person singular has a different tone pattern than in the other persons. In the third person singular, -vwa keeps its underlying tone, high tone, while in the other persons it reverses its high tone to low tone, as the rules in (9) predict.

Non-Relatives

m̄- vwá n̄- sá má 'I was sick '
 ú- vwá ú- sá má 'You were...'
 ù- vwá ù- sá má 'He was ...'
 tú-vwá tú-sá má 'We were ...'
 nú-vwá nú-sá má 'You were...'
 bà-vwá bà-sá má 'They were..'

Relatives

m̄- vwà n- sá má 'I who was sick...'
 ù- vwà ú- sá má 'You who were... '
 ú- vwà ú- sá má 'He who was... '
 tú-vwà tú-sá má 'We who were... '
 nù-vwà nú-sá má 'You who were... '
 bà-vwà bà-sá má 'They who were... '

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ROOT CONTROL, UNDERSPECIFICATION, AND ATR HARMONY.*

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In Lama phonology [+ATR] high vowels trigger harmony across the word, while [+ATR] mid vowels do not. When they occur with [+ATR] high vowels within the same root, the mid vowels do not block the spreading of [+ATR] value on to the affixes adjacent to them. Assuming that affixes are not specified for ATR in the UR, I argue that the [+ATR] mid vowels are transparent. Considered within the combined approach of Root Controlled Harmony (Clements 1981) and the theory of underspecification (Pulleyblank 1983, 1986, and 1988, and particularly van der Hulst and Smith 1986), the ATR vowel harmony in Lama becomes straightforward. It is shown in this paper (a) that [+ATR] is the only value needed for the feature ATR in the UR; (b) that the OCP plays a crucial role in the vowel harmony of Lama.

0. Introduction.

This paper is an investigation into ATR (Advanced Tongue Root) vowel harmony in Lama, a Gur language of the sub-oriental family. The harmonic facts considered here can be summarized as follows: (1) High vowels identified as [+ATR] in the Underlying Representation (UR) of the language never occur with [-ATR] vowels at the surface level. (2) Mid vowels identified as [+ATR] in the UR do appear with [-ATR] vowels at the surface level. (3) The low vowel /a/ surfaces as: (a) [+ATR] in roots with [+ATR] high vowels; (b) [-ATR] in roots with [+ATR] mid vowels, and (c) [-ATR] with all the other [-ATR] vowels.

Except for the asymmetric behavior of the [+ATR] mid vowels with respect to the low vowel (and some complexities involving affixes to be discussed below), the ATR vowel harmony would be straightforward within the approach of the 'Root Controlled Harmony' proposed in Clements 1981 and supported in Pulleyblank 1986 and 1988.

Within that approach, the feature [ATR] is a property of the root, which in turn, passes it down to the affixes which are not specified for that feature. Crucial to Clements's theory, both feature values, [+ATR] and [-ATR], must be specified in the UR to account for Akan vowel harmony. His motivation is that the low vowel /a/ in Akan is an opaque segment which must be lexically specified as

[-ATR] in the UR. Moreover, he argues that the low vowel must link to that lexical ATR value before the association conventions. It follows from Clements's theory that both harmonic roots and disharmonic roots must be posited in the UR to explain the presence of [+ATR] and [-ATR] vowels within the same word at the surface level. An important point to remember from Clements's framework is that: (1) opaque segments such as the low vowel in Akan block [+ATR] harmony; (2) they do not undergo [+ATR] harmony; and (3) they spread their lexically specified [-ATR] value on to the affixes within their domain.

Contrary to the behavior of opaque segments exemplified by the low vowel in Akan (Clements 1981) and Bari (Hall and Yokwe 1978, van der Hulst and Smith 1986), the mid vowels in Lama pose harmony problems of the following nature. First, when a suffix of the structure CV is attached to a monosyllabic root with a mid vowel, the vowel of that suffix is realized as [-ATR] irrespective of the ATR value of that root vowel in the UR. Second, when a suffix of the same structure is attached to a bisyllabic root with both high and mid vowels, the suffix is realized as [+ATR], provided the high vowel of the root is [+ATR] in the UR; the position of the root vowels has no bearing on this harmonic fact. Thirdly, if a prefix and a suffix attach to a [+ATR] mid vowel root, both affixes will be realized as [-ATR]; they will appear as [+ATR] if the root vowel is a [+ATR] high vowel. And finally, the low vowel /a/ neither blocks nor triggers ATR harmony in Lama.

In this paper, I argue that the 'Root Controlled' approach proposed in Clements 1981 cannot account for Lama ATR vowel harmony without resorting to various ad hoc rules. I will show that the asymmetric facts presented by Lama vowel harmony fall out from the general principles of Universal Grammar (UG) when considered within the framework of both 'Root Control' and 'Underspecification'.

In Pulleyblank 1986 and 1988, it is argued that for ATR as a contrasting feature only one value is specified in the UR; the other value is supplied by rule. Pulleyblank convincingly shows that [+ATR] is the specified value for the feature ATR in the UR. I adopt this position for the analysis of the data discussed in this paper. Following van der Hulst and Smith (1986), I will argue that the mid vowel in Lama is lexically linked to [+ATR] when it is specified for that feature in the UR. I will further argue that, being linked to its lexical ATR value before the association conventions, the [+ATR] mid vowel acquires the status of a neutral vowel in Lama. Within this approach, the ATR harmony becomes straightforward in that the neutral vowel neither spreads nor prevents the spreading of the [+ATR] value from other sources.

The paper is structured as follows. The first section introduces the vowel system of Lama. The second section presents and illustrates the harmonic facts with respect to the features ATR, High, and Low. In section 3, I first discuss the Root Controlled Principle and relevant aspects of the theory of underspecification in relation to the facts presented in section 2; I then propose an analysis of these facts within a combined approach of Root Controlled Harmony and Underspecification. The final section of the paper summarizes my arguments.

1. The vowel system in Lama.

Throughout this paper, the characters in bold face indicate [+ATR] vowels and the vowels in normal characters are [-ATR] ones. The symbols (ə/ɜ) will be used for the [+ATR] and [-ATR] schwas respectively. Brackets [] indicate segments at the surface level and slashes / / indicate segments in the UR. The acute accent marks a high tone, the grave accent indicates a rising tone (which is always realized as a low tone at the surface level), and the circumflex accent marks a falling tone; the level low tone is not marked to distinguish it from the rising tone.¹

1.1. Front and back vowels.

Lama has 4 front vowels and 4 back vowels described and contrasted in this section. The front vowels are presented below.

The vowels [i/i]. The two vowels differ from each other in the amount of pressure required from the tongue in their production. [i] is produced with high tension on the tongue and with the vocal cords in strong vibration; as a result, the front vowel [i] is more audible than its counterpart [i]. In the production of the latter, no tension is required from the tongue and the vocal cords are hardly vibrating, resulting in a less perceptible sound. The two sounds are contrasted in minimal pairs like the following.

- (1) si 'wear'
 si 'enter'
 sisə 'tighten'
 sisɜ 'stick in'

The contrast between the two vowels is evidence that both of them are required in the UR.

The vowels [e/e]. In the production of the vowel [e], the tension required from the tongue is lower than in the production of the front vowel /i/; but that tension is higher than in the production of the front /i/ or the vowel [e]. The following illustrates the contrast between the two vowels [e/e].

- (2) sé 'run'
 sé 'plant'
 resɜ 'dream'
 resɜ 'pass (something) over'

As in the case of the high vowels, the preceding illustration shows that both /e/ and /e/ exist in the UR of the language. The difference between the pairs i/i and e/e is in the height the tongue adopted in the production of each pair. Following Chomsky and Halle 1968, I argue that it is the feature [high] which distinguishes the two pairs of front vowels. The value [+high] characterizes the vowels i/i whereas [-high] describes the pair e/e.

There are 4 contrasting back vowels in Lama; these are [u/u], [o/o], and they contrast in the same way as the front vowels.

The high back vowels [u] and [u] contrast in pairs like the following.

- (3) su 'plant on'
 su 'take'
 lutə 'stir'
 lutɜ 'intermingle'

The following illustrates and establishes the contrast [o/o].

- (4) wó 'open halfway'
 wo 'spread (mat, sheet)'
 tósɜ 'put together'
 tosɜ 'ward off, be prepared for'

Apart from these sets of front and back vowels, central vowels are also attested in the language.

1.2. Central vowels.

Three types of central vowels can be identified in the UR of the language on the basis of their contrasting distribution; the three vowels are [ə/ɜ], and [a].

The vowels [ə/ɜ]. In the production of the [+ATR] schwa [ə], the tongue remains in its normal position; however, a tension is felt at the root of the tongue, which is more advanced. The vocal cords vibrate, resulting in an audible sound. The opposite activity in the root of the tongue and the vocal cords, while the tongue is in its normal position, produces the [-ATR] schwa [ɜ]. The following illustrates the contrast between the two types of schwa.

- (5) ləl 'shrink'
 lɜl 'give birth'
 lətə 'skin an animal'
 lɜtɜ 'get loose'

The vowels [ə/ɜ] contrast with the high front vowels in the following.

- (6) lətə 'skin an animal'
 litə 'tease'
 lɜtɜ 'get loose'
 litɜ 'write badly'

The two vowels also contrast with the high back vowels as shown in the following.

- (7)
- | | |
|------|-------------------------|
| lətə | 'skin an animal' |
| lutə | 'stir up' |
| lətɜ | 'get loose' |
| lutɜ | 'intermingle' |
| təl | 'carry repeatedly' |
| tul | 'become short' |
| tɜl | 'open' |
| tul | 'wrap around the waist' |

The various contrasts between the two schwas and the other vowels establish their existence in the UR of the language.

The vowel [a]. In the production of this vowel, the tongue is completely relaxed; no tension is exercised on the tongue. The main difference between this vowel and the other vowels is that the opening of the mouth is wider in its production. The following illustrates the contrast between the three central vowels.

- (8)
- | | |
|------|---------------|
| sasɜ | 'spur on' |
| sɜsɜ | 'put upright' |
| səsə | 'hang down' |
| tal | 'arrive' |
| tɜl | 'open' |
| təl | 'dig up' |

The vowel [a] also contrast with the other vowels as shown below.

- (9)
- | | |
|----|-----------------------|
| fá | 'beg for' |
| fe | 'give way' |
| sá | 'scratch' |
| sé | 'run' |
| su | 'plant on' |
| su | 'take' |
| si | 'wear' |
| si | 'enter' |
| wa | 'dance' |
| wo | 'lift, open a little' |
| wo | 'spread a mat' |

Unlike the other vowels, the low vowel /a/ does not show any contrast in the values of the ATR feature in monosyllabic words, where it is always realized as [-ATR]. At the surface level, however, it occurs as [+ATR] in words with a [+ATR] high vowel. Assuming that the low vowel acquires the feature value [+ATR] through vowel harmony, I tentatively classify it as [-ATR] in the UR. Evidence for this approach is provided in the next section. On this basis we can claim that Lama has eleven vowels in the UR.

1.3. Lama vowels and ATR features

The phonetic details of ATR as a distinctive vowel feature are extensively covered in Clements 1981. Following Stewart 1967, Clements notes that 'the phonetic basis of the distinction between [two sets of] vowels ... is the position of the tongue root: advanced for the vowels of [one set], neutral or retracted for the vowels of [the other set]' (111).

Recalling the contrasts examined in the preceding section, it follows that the feature values [+] and [-] ATR characterize each pair except for the low vowel /a/. As mentioned earlier, the low vowel is always realized as [-ATR] in monosyllabic words. However, in polysyllabic words it shows a [+ATR] value when it occurs in the environment of any preceding or following [+ATR] high vowel, as illustrated by the following data:

(10)	Set 1		
	asəseer	'maggot'	
	apu	'head louse'	
	aluku	'chicken coop'	
	wunasə	'rivers'	
	ləmasə	'nape of the neck'	
	kurasə	'venereal diseases'	
	tuka	'shrubs'	
	Set 2		
	Singular		Plural
	ci	'father'	cinâ
	ri	'mother'	rinâ
	rəm	'iroko'	rəmnâ
	nun	'aunt'	nunnâ
	aci	'daddy'	acinâ
	Set 3		
	Singular		Plural
	rəm	'snake'	rəmnâ
	ra	'friend'	ranâ
	ko	'sister'	konâ
	raal	'brother'	raalnâ
	nəm	'grinding stone'	nemnâ

The first set in (10) shows the low vowel cooccurring with [+ATR] high vowels. In set 2, the low vowel of the suffix *-na* is [+ATR] with [+ATR] roots, whereas in set 3 it appears as [-ATR] with [-ATR] roots.

For an adequate presentation of the harmonic facts and problems addressed in section 3 of this paper, I adopt Clements's description of the feature ATR presented above, and I propose the ATR classification of Lama vowels below.

(11) Vowels and ATR features.

	i	i	e	e	ə	ɜ	a	o	o	u	u
ATR	+	-	+	-	+	-	-	+	-	+	-

Note that the classification in (11) shows only the ATR values for each vowel in the UR. Since the value [+ATR] is predictable for the low vowel, the question we need to address is what rules underlie ATR harmony in Lama.

2. Lama vowel harmony: basic facts.

The vowel chart in (11) shows two sets of ATR vowels: a [+ATR] set with 5 vowels and a [-ATR] set with 6 vowels. The general harmony type is the root-controlled harmony where the same affix can show an alternation in ATR feature value depending on the context in which it appears.

2.1. ATR alternation in suffixes.

In the context of [+ATR] roots, suffixes always appear as [+ATR], but they appear as [-ATR] with [-ATR] roots. The following examples show this alternation in the causative suffix -sɜ.

(12)	Set 1			
	wúr	'become black'	wur-sə	'blacken'
	təw	'come down'	tə-sə	'bring down'
	Set 2			
	tu	'eat'	tu-sɜ	'feed someone'
	tel	'escape'	tel-sɜ	'save s.o.'s life'

This sample alternation in affixes shows that Lama has an ATR vowel harmony which is root-controlled.

While this generalisation holds in most cases, the ATR harmony processes are more complicated as will be shown in the next sections.

2.2. Alternation in the vowel [a].

In section 1, we observed that the vowel /a/ does not contrast in the values of the ATR feature as the other vowel do in the UR. However, whenever it occurs as [+ATR] at the surface level, a pressure is felt at the root of the tongue which is advanced. The [+ATR] vowel [a] occurs in roots with [+ATR] high vowels only. Consider the following.

- (13) **sau** 'rich person'
nawu 'bull'

As an affix, this vowel also shows an alternation in ATR values. The following examples illustrate this alternation according to the ATR value of the root.

- (14) **Set 1 [+ATR]**
ci 'father' **ci-nâ** 'fathers'
rãm 'iroko tree' **rãm-nâ** 'iroko trees'
- Set 2 [-ATR]**
rí 'python' **rí-nâ** 'pythons'
r3m 'snake' **r3m-nâ** 'snakes'

From these illustrations, a tentative conclusion is that [+ATR] roots govern ATR harmony in affixes in general and in the low vowel /a/ in particular. A more problematic case in this vowel harmony system concerns the [+ATR] mid vowels.

2.3. The case of the [+ATR] mid vowels.

The relevant facts related to mid vowels are as follows.

1) They can cooccur with [-ATR] vowels in the same root, while their [+ATR] high vowel counterparts do not. The examples below illustrate roots with [+ATR] mid vowels and other [-ATR] vowels.

- (15) **cal3nko** 'chameleon'
ponta 'leopard'
centi 'friend'

2) The vowel of a suffix is realized as [+ATR] only when no consonant intervenes between that vowel and the [+ATR] mid vowel of the root. This is illustrated below.

- (16) **ko** 'shout' **ko-u** ---> **kóou** 'to shout'
se 'run' **se-u** ---> **séeu** 'to run'

The suffix *-u* marks the infinitive on the verb. The vowel lengthening process and other segmental alternations related to suffixation are fully discussed in Ourso 1988.

3) A suffix of the structure CV never harmonizes with the root [+ATR] mid vowel. This is illustrated in the following, where *-s3* and *-u* are respectively noun class 6 and noun class 3 markers.

(17)	<i>le-s3</i>	--->	<i>les3</i>	'patridges'
	<i>wó-s3</i>	--->	<i>wos3</i>	'rivers'
	<i>lek-U</i>	--->	<i>leku</i>	'arrow shaft'

The relevant harmonic facts presented in this section are summarized as follows: (a) [+ATR] mid vowels cooccur with [-ATR] vowels in polysyllabic roots (e.g. *cal3ηko* 'chameleon'); (b) None of the vowels of suffixes with the structure CV are realized as [+ATR] after [+ATR] mid vowels in the word.

This discrepancy in the harmonic behavior of the [+ATR] high vowels and the [+ATR] mid vowels raises several questions in relation to the harmonic rules in Lama.

First, is ATR harmony a property of the root or is it a property of individual vowels? That is, is ATR assigned to the root as a floating feature, does a linking convention followed by a spreading rule then apply to spread the ATR value onto the other vowels of the word? Or is ATR assigned and linked to specified individual vowels in the root, and those vowels in turn spread the ATR value onto the adjacent vowels, not specified for that value?

Second, if ATR harmony is root-controlled, are there disharmonic roots? In short, what principles underlie the ATR harmony presented by the facts above?

3. Analysis.

For an attractive analysis of the harmonic facts presented in the sections above, I consider below some aspects of 'Root Controlled Harmony' discussed in Clements 1981, and underspecification in ATR features as discussed in Pulleyblank 1983, 1986, and 1988. I argue that a combination of some aspects of the 'Root Controlled Harmony' approach and some aspects of the underspecification theory accounts for the facts presented above in a straightforward way.

3.1. The principle of root controlled harmony.

The theoretical principle of 'Root Controlled Harmony' developed in Clements 1981 and supported in Pulleyblank 1986 and 1988, is adopted with modifications which will be presented in this section.

The main point in Clements's framework is that the value [+ATR] or [-ATR] is assigned to the root, and it is the root which thus passes that value on to the affixes. It follows, then, that affixes are not specified for any ATR value in the UR.

In this view, the facts presented in relation to roots with [+ATR] high vowels, on the one hand, and roots with [-ATR] vowels, on the other hand, would be straightforward. That is, the value [+ATR] is assigned to the roots with [+ATR] high vowels, and [-ATR] is assigned to the other roots (except for roots with [+ATR] mid vowels which constitute a special case). Words like *acina* 'daddies' and *ahumi* 'cicada' will have the following representation where the ATR feature is not associated with any specific ATR-bearing unit.

- (18) (a) +A (b) -A
 A-cl-nA A-hUm-l Root ATR

The association convention which links the floating [ATR] of the root to the leftmost ATR-bearing unit will then link [+A] to the leftmost vowel in (a), i.e. to the low vowel; likewise, [-A] will link to the low vowel in (b) as shown below.

- (19) (a) +A (b) -A
 | |
 AcInA AhUmI Root ATR-Association.

Finally, the association convention spreads the value of the linked ATR onto the adjacent ATR-bearing units from left to right to derive the expected results in (20).

- (20) (a) +A (b) -A
 / \ / \
 AcInA AhUmI
 acina ahumi Spreading
 Phonetic realisation

Recall that the third category of facts presented in the previous sections involved roots with [+ATR] mid vowels and [-ATR] vowels; for convenience I repeat some of these data below.

- (21) wonka-s3 'donkeys'
 wonda-s3 'months'
 lek-u 'arrow shaft'
 póntá-nâ 'panthers'
 ho-s3 'pregnancies'
 wo-s3 'black bugs'
 le-s3 'partridges'

Within the root-controlled approach illustrated so far, the category of roots exemplified above can be accounted for by what Clements (1981) has characterized as 'disharmonic roots'; that is, roots specified for both [+ATR] and [-ATR]. This implies that the low vowels in the polysyllabic roots above contribute an ATR value in the harmonic processes.

While this approach explains the cases exemplified in (21), it fails to explain why the low vowel behaves as an opaque segment in the context of [+ATR] mid vowels, and as a neutral vowel in the context of [+ATR] high vowels.

Note that, under this approach, the low vowel is opaque in (21) since it blocks the spreading of the preceding [+ATR] value. Furthermore, it spreads its own [-ATR] value on to the vowels on its right; this characteristic is common to opaque vowels (Clements 1981, van der Hulst and Smith 1986, van der Hulst et al. 1986).

Recall that in roots with [+ATR] high vowels, the low vowel always shows up with a [+ATR] value. In such contexts, the low vowel behaves then as a transparent segment in that it neither blocks [+ATR] spreading nor spreads its own [-ATR] value. Moreover, note that the low vowel itself undergoes [+ATR] harmony, which is expected from transparent vowels in ATR harmony systems.

Without ad hoc rules, the disharmonic root approach can explain neither this asymmetry in the low vowel nor why the suffix in words like *les*³ 'partridges' is always realized as [-ATR] while the root vowel is [+ATR]. An independent principle could be motivated to account for this asymmetric harmony; that is, a principle which would assign the two ATR values to these types of roots as a language-specific rule with respect to [+ATR] mid vowels. In this view, a single root is then assigned [+A] and [-A] and where a feature value has no ATR-bearing unit to anchor to, it will remain unlinked and therefore unpronounced. In Lama, words like *wO* /*wOs*³ 'black bug/s' will have the representation below.

(22)	(a)	+A -A	(b)	+A -A
		wO		wO-s3

Assuming a one-to-one, left to right association, it follows that the value [-ATR] will remain unpronounced in (22a), while in (22b) it will associate to the ATR-bearing unit of the suffix, and therefore be realized at the surface level.

This approach, however, will not explain why prefixes like *a-* in *ako**lu* 'dumping area' is realized as [-ATR] if we assume root-controlled harmony. We would expect those prefixes to acquire the [+ATR] value from the adjacent [+ATR] mid vowel. Moreover, how do we account for the fact that the two values of [ATR] are only assigned to roots with [+ATR] mid vowels?

In the remaining part of this section, I will show that a combination of some aspects of the Root Controlled Harmony with some aspects of the underspecification theory accounts for the asymmetric ATR harmony in Lama in a straightforward way.

3.2. Underspecification in ATR values.

Of interest for the present problem are the aspects of underspecification theory discussed in Pulleyblank 1983, 1986, and 1988.

The theory of underspecification stipulates that for a contrasting feature, only one value is specified and the other value supplied by rule. For instance, if the value [+ATR] is underlyingly specified for a set of vowels, it becomes redundant to specify the other value. However, when harmony rules apply contrasting the two values at a certain level of phonological derivation, the value [-ATR] is assigned by Universal Grammar (UG) to those ATR-bearing units not specified for the feature ATR.

Following these ideas, the specification of the vowels in the Lama vocalic system is revised as follows with respect to [ATR] values.

(23)	i	i	e	e	ə	ɜ	a	o	o	u	u
ATR	+		+		+			+		+	

From this feature specification in the UR, it follows that the non-specified value for the target feature is provided by a redundancy rule such as

(24) [] ----> [-ATR]

That is, an ATR-bearing unit is assigned [-ATR] if it is not specified for that feature.

Assuming with Clements (1981), that the root is the domain for ATR harmony under discussion, the following principles can be formulated to account for the facts presented so far.

(25) Principles for Lama ATR harmony

- I Affixes are not specified for ATR features; they obey the principle of root control (Clements 1981).
- II (a) [+ATR] is the only specified feature value in the UR for [ATR].
- (b) [ATR], as the property of the root, is a floating feature.
- III (a) [ATR] of the root is linked to the leftmost A-bearing unit (vowel) after affixation.
- (b) Spreading takes place within the word from left to right after linking.
- IV [] ----> [-ATR].

From Principle I, it follows that no affix can be assigned a [+ATR] value; it also follows from the redundancy rule in IV that an affix can acquire a [-ATR]

value if, for some reason, it does not acquire the specified feature value through harmonic rules from Principles II and III.

Crucial to this analysis is the assumption that Principle IV is a direct consequence of Principle II; and as such, it follows that IV automatically applies to roots not specified for [ATR]. It is also assumed that whenever IV applies to a root, Principle III is automatically triggered and thus applies.

Note, however, that while these principles account for the facts related to the roots with [+ATR] high vowels and the roots with vowels not specified for [ATR], they make incorrect predictions for roots with [+ATR] mid vowels.

Recall from the data in (21) that when a root has both a low vowel and a mid vowel, the low vowel is always [-ATR] even if the mid vowel is [+ATR]. Within the framework of underspecification, it follows that the low vowel (and affixes) cooccurring with the [+ATR] mid vowels acquires its [-ATR] value either by Principle IV stipulated above or by a different stipulation. Principle IV might apply in this case because for some reason the [+ATR] mid vowel fails to spread its value. Following van der Hulst and Smith (1986), I argue that mid vowels are neutral segments in Lama. In van der Hulst and Smith's analysis neutral vowels can be opaque or transparent. They are opaque when their idiosyncratic value is the opposite of the feature value specified in the UR. In the case of ATR harmony, the value [+ATR] being the specified one, it follows that opaque vowels assume [-ATR] as their lexical property, and block [+ATR] harmony. In contrast to opaque vowels, transparent vowels assume as their lexical property the specified value for the feature under consideration. In the present case, the value [+ATR] is therefore the idiosyncratic property of the mid vowel, which neither spreads nor blocks the spreading of that feature value from other sources.

In relation to mid vowels in Lama, I argue that [+ATR] is their lexical property when they are underlyingly specified for the feature ATR; that is, the value [+ATR] is not a floating feature for mid vowels. It follows from this approach that three types of ATR roots should be posited in Lama. (1) Roots with a floating [+ATR] value; these roots are characterized by high vowels underlyingly specified for the feature ATR. (2) Roots with a lexically linked [+ATR]; these are characterized by the mid vowels underlyingly specified for ATR. And (3) roots with no ATR specification; these are exemplified by the words which show [-ATR] vowels all across at the surface level.

To account for the asymmetry displayed by type 2 roots, I propose that in addition to the principles which govern root harmony, Lama has a complement rule of the structure

$$(26) \quad \left[\begin{array}{c}] \\ \downarrow \\ \vee \end{array} \right] \quad \text{-----} \rightarrow \quad \left[\begin{array}{c} [-ATR] \\ \downarrow \\ \vee \end{array} \right]$$

That is, assign a [-ATR] value to an ATR-bearing unit linked to an empty ATR slot. The complement rule applies after the principles in (25). Note that while Principle IV is provided by UG, the complement rule is language specific.

The interaction between the complement rule and the principles stipulated for [ATR] harmony is illustrated below for the words *acina* 'daddies', *ahumi* 'cicada' and *akolu* 'dumping area'.

(27)	(a)	+A	(b)	+A	(c)	+A	UR
		A-cln-A		A-hUm-l		A-kol-U	

The underlying representation of the words in (27a) and (27b) shows ATR as a floating feature assigned to the root by the relevant rules in (25). The root in (27c) shows the [+ATR] value as a linked idiosyncratic property of the neutral mid vowel. The root harmony Principle III applies to (27a) and (27b) to give the derivation in (28).

(28)	(a)	+A	(b)	-A	Association and Spreading Phonetic realisation.
		AcInA acina daddies		AhUmI ahumi cicada	

Since (27c) does not satisfy the principles underlying the root-controlled harmony argued for so far, it follows that the spreading of the idiosyncratic [+ATR] from the transparent mid vowel does not take place. Assuming that the complement rule (26) is triggered by the ATR status in type 3 roots, the derivation in (27c) will be completed by that rule as shown in (29).

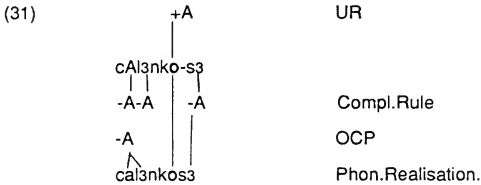
(29)	+A		
	AkoLU	UR	
	-A -A	Harm.rules inappl.	
	akolu	Complement rule	
		Phonetic realisation.	

An issue raised by the present analysis relates to polysyllabic roots of the following nature.² First, there are roots containing both [+ATR] mid vowels and other [-ATR] vowels as in the following.

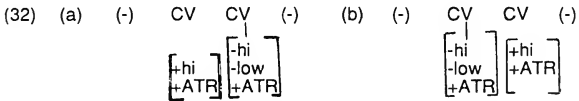
(30)	wonka-s3	'donkeys'
	kponseer	'mad man'
	cal3nko	'chameleon'

In cases like those in (30), do we assign the value [-ATR] as a floating feature to the root in addition to the lexically linked [+ATR]? It follows from the framework developed here that an assignment of the redundant value to such roots is not necessary. The complement rule presented in this analysis is motivated to handle this particular case which is outside the scope of root-controlled harmony. It is my position, however, that when the complement rule

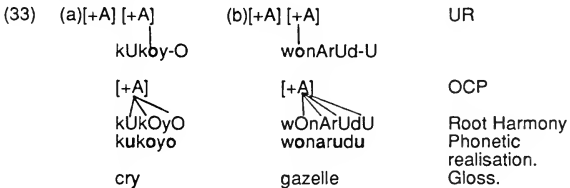
applies to several adjacent ATR-bearing units, the OCP (Obligatory Contour Principle) is automatically triggered. Thus, the derivation of *cal3nko3* of type 3 roots will have the following representation.



Second, note roots containing both [+ATR] high vowels and [+ATR] mid vowels of the following combination where the parentheses indicate potential affixes.



The representation in (32) predicts that the affixes adjacent to the mid vowel will surface as [-ATR] since spreading from that vowel fails under the analysis presented so far; this representation further predicts that the affixes above cannot link to the floating [+ATR] without crossing the lexical association line of the mid vowel. But as already shown by the facts in section 2, the affixes in the context of the structures in (32) are realized as [+ATR]. Since the lexical ATR value of the mid vowel does not spread, it follows that roots exemplified by the structures in (32) have two [+ATR] values, that is, the lexical value of the mid vowel and the floating value of the root. The OCP applies to delink and collapse the inert idiosyncratic [+ATR] value of the mid vowel with the dynamic [+ATR] of the root. This process is illustrated below.



4. Conclusion.

In this paper, I have shown that ATR vowel harmony in Lama is straightforward following the theoretical assumptions that: (1) [ATR] harmony is the property of the root; (2) [+ATR] is the feature value specified for [ATR] in the UR (it therefore follows that [-ATR] is a redundant feature not specified); and (3) when they are specified for [ATR], mid vowels assume the value [+ATR] as their idiosyncratic property (in this case the mid vowels are transparent). Consequently, root harmony is not blocked under appropriate conditions.

NOTES.

*I am grateful to L. Downing and H. H. Hock for their invaluable comments and suggestions on an earlier version of this paper. I wish to thank especially C. Kisseberth for his attention to my work in general and his interest in this paper in particular. I benefited a lot from his wide knowledge.

¹The data in this paper are based on the material of the second chapter of my dissertation. The details on the segmental and tonal alternations are considered in that work. Note only that there are two low tones in Lama; the one marked by the grave accent is in fact a rising tone which simplifies to a low tone at the surface level. Further information on the tonal aspects can be found in Kenstowicz, Nikiema, and Ourso 1988.

²Of a total of 1019 nouns and 540 verbs considered only 7 roots show the combination of both [+ATR] high vowels and [+ATR] mid vowels. One root shows the combination [+ATR, +mid] and [-ATR,-mid,-low] (cf. 30). Combinations involving the low vowel in the roots are numerous. One root shows two [+ATR] mid vowels (*kponsen* 'fiber straw'); this noun belongs to noun class 1 and does not take any noun class suffix. My intuition is that even if that noun were to take the NC2 suffix *na*, the vowel of that suffix would appear as [-ATR].

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WHERE'S MY NP? NON-TRANSFORMATIONAL ANALYSES OF VEDIC PRONOMINAL FRONTING*

Steven Schäufele

Vedic Sanskrit shows some evidence of hierarchical structure (i.e. VPs and PPs). This means the grammar allows NPs not to be immediately dominated by S. However, certain determiners routinely behave as immediate daughters of S, even when 'controlled', in terms of morphological agreement, by NPs which are not. This paper compares the ability of two non-transformational frameworks, GPSG and LFG, to describe the relationships between such pronominal determiners and their controlling NPs. I conclude that LFG provides a much simpler, more straightforward and elegant description of the data than GPSG.

0. Introduction

'WH-fronting', generally understood as the fronting of relative and interrogative pronominals, is a common tendency in Indo-European (IE) languages. The parallel tendency in Vedic Sanskrit fronts not only relative and interrogative, but certain demonstrative pronominals as well. However, whereas in modern IE languages such as English the entire phrase dominating the WH-word is fronted along with it, in Sanskrit only the pronominal word, not its 'controlling' NP, is fronted. See (1) below. (1a) shows an acceptable English clause, in which the entire PP dominating the WH-word 'which' has been fronted. (1b-c) show similar strings in which only the pronominal word(s) have been fronted; clearly these are unacceptable. (1d) shows a clause from the Vedic Prose corpus, in which the constituents occur in approximately the same order as their English equivalents in (1c). This is an acceptable Sanskrit clause.

- (1) (a) For which deities those oblations have been taken
(b) *Which those oblations have been taken for deities
(c) *Which those for deities oblations have been taken

(d) yābhyaḥ eva tāni devatābhyaḥ havīmṣi gr̥hītāni
 'which'-D PTCL 'those'-N 'deities'-D 'oblations'-N 'taken'

bhavanti

'are'

'For which deities those oblations are taken' (AB 7.2.3)

In this paper, I will discuss the possibility of describing the resulting strings without transformations. I will compare the relative abilities of Generalized Phrase-Structure Grammar (GPSG) and Lexical-Functional Grammar (LFG) at this task, and will conclude that, while GPSG may be able to provide an adequate description at great cost, LFG provides a much simpler, more straightforward, and elegant description.

This paper is necessarily corpus-based. Whereas a syntactician investigating a living language can solicit a native speaker's intuitions, I am limited to the strings actually attested in Vedic literature. While such a pre-recorded body of literature may occasionally reflect a wider variety of grammatical practice (e.g. idiolectal, dialectal, or registral variation) than a fully formal theory of grammar may feel comfortable with, I must assume that all strings attested in the literature are grammatical, and seek to elucidate and describe the attested patterns. Whenever I present a string with a star (*) or describe it as 'inattestable', I mean that I have made it up myself and that a survey of a wide range of data has convinced me that there are patterns in Vedic grammar which said string violates. Similarly, a string which I have marked with a question mark is one which, attested or not, my survey of the corpus leads me to believe may be acceptable, but highly marked.

In the first section of this paper I will outline some preliminary assumptions about how constituent structure (c-structure) in general should be described and about the c-structure of Vedic Sanskrit in particular. In the second section I will attempt to build a descriptively adequate account of the facts within GPSG, an endeavour which I will conclude is probably not worth the trouble, especially when compared with the straightforward way in which LFG accounts for the same facts.

1. The description of constituent structure

1.1. General assumptions

1.1.1. ID/LP format

Throughout this paper I will be using ID/LP format (defined below) in describing c-structure, whether the theoretical context is GPSG or LFG. While early literature in LFG (e.g. Bresnan 1982) does not make use of ID/LP format, I have not found any theoretical reason why it would be inappropriate, and in fact it is used in an LFG context in Bresnan & Mchombo 1987. I assume that such usage is legitimate and will not try to defend it.

Briefly, ID/LP format makes possible the independent expression of generalizations about dominance or precedence relations. Instead of a 'Phrase-Structure Grammar' defined by a set of explicit phrase-structure rules in the manner of Chomsky 1965, in ID/LP format there are two independent sets of rules which together generate a PSG-describable language. An ID or 'Immediate Dominance' rule of the form shown in (a) stipulates an unordered set of permissible daughters of a given mother. An LP rule imposes constraints on the relative order of two or more constituents, whenever they occur as sisters. If the grammar allows two constituents to occur as sisters but has no LP rule referring to them, they are free to occur in either order. The format of an LP rule is as shown in (b) whose meaning is that, whenever they occur as sisters, A must precede B (and C) and B must precede C.

(a) $A \rightarrow B, C, D$

(b) $A < B < C$

A GPSG with ID/LP format defines a tree as well-formed if and only if every immediate dominance relation in it is licensed by some ID rule and violates no LP rules.

Since LFG crucially depends upon the annotation of constituents for grammatical function (GF) such as Subject, Object, etc., within that framework the constituents specified in ID rules, and possibly LP rules as well, would have to be susceptible to annotation for GF.¹ Further, ID rules would not need to include any semantic component such as they have to have in GPSG, since semantics in LFG is read off a separate level of analysis, f-structure.

1.1.2. 'Metarule'-type generalizations across ID rules; SLASH

I also adapt to LFG some of the 'metarule'-type strategies developed within GPSG for describing generalizations across sets of ID rules. In doing so, I note that some details of these strategies are not necessary in LFG, since LFG defines a distinct level of analysis, f-structure, within which some of the relevant information may be encoded. As long as a constituent is somewhere in the clause, it can be cross-referenced with an appropriate element in f-structure and is in that sense 'accessible' to f-structure.² Therefore, GPSG's SLASH strategy would be useful in LFG only in licensing ID rules, and therefore c-structures, that might not otherwise be licensed.

SLASH in GPSG is a 'category-valued' feature, taking a category (such as V or NP) as its value. A category marked for a SLASH feature with the value X is a category dominating, not necessarily immediately, a gap of category X.

SLASH is the means whereby GPSG describes 'unbounded dependencies'. I am not sure to what extent it and the double-arrow convention in LFG are notational variants of each other. For the purposes of this discussion, I will use SLASH to describe strings in which I believe some sort of 'extraction' has taken place.³

1.2. Assumptions about Vedic constituent structure

1.2.1. General assumptions

1.2.1.1. Only two Bar levels

I assume that Sanskrit distinguishes only two Bar levels, lexical and phrasal. Hale 1982 and Speas 1988 have argued that, either universally or with regard to certain specific languages, there may be no point in trying to distinguish between different levels of phrasal projection of a same lexical category. I have yet to see any strong evidence of such fine distinctions in Sanskrit. The freedom of constituent order characteristic of this language may, in fact, be due in part to the lack of intermediate levels of hierarchical structure which might otherwise distinguish between types of NP- modifiers or -complements, or between VP-adverbials and complements, or between different types of VP-complements. Therefore, in what follows I will distinguish between lexical and phrasal categories only.

1.2.1.2. Adverbials

For brevity's sake I will use the term 'adverbial' (abbreviated Adv) to cover a disjoint set of categories including the following:

- (a) lexical adverbs and projections thereof, if any⁴
- (b) adpositional phrases (Most if not all PPs in Sanskrit function semantically as adverbials.)
- (c) some NPs in any case but Nominative (There are adverbial functions for every non-Nominative case in Sanskrit.)

From a formal point of view, these different categories are difficult, if not impossible, to collapse into one.⁵ But, as far as this paper is concerned, they have the same syntactic distribution. Therefore, rather than multiply ID rules in order to cover them all, I will subsume them all under the abbreviatory category 'Adv'.

1.2.2. Preliminary ID rule schemata

Where ID rule schemata would differ for GPSG and LFG, I will give both (a) the GPSG form and (b) the LFG form. Any category in parentheses is optional; a category qualified by a star (*) may occur an indefinite number of times.

- (2) (a) $VP \rightarrow NP, (Adv)^*, H$
 [+SUBJ] [-SUBJ]
- (b) $S \rightarrow \quad NP, \quad (Adv)^*, \quad VP$
 (\uparrow SUBJ = \downarrow) (\uparrow = \downarrow)

(3) (a) NP → (Det), (NP), (AP), HØ
[CASE:GEN]

(b) NP → (Det), (NP), (AP), HØ
(↑Det = ↓) [CASE:GEN] (↑MOD = ↓)

The category label 'Det' is intended to cover a variety of pronominal elements that can serve as NP determiners. The limits of this category in relation to this rule schema and the previous one will be a major focus of later discussion.

All nominal elements in Sanskrit are marked for gender, number, and case. I assume that these are 'Head Features', inherited by head nouns from their mothers and spread to adjectives and determiners according to the normal procedures in either framework.⁶

Of course, it is possible for the Head N of an NP to be +NULL, meaning that it is phonologically empty, while still being the NP Head.

(4) VP → (Adv)*, (NP)*, HØ

(5) PP → NP, HØ

(6) V → (Pfx), H

Like 'phrasal verbs' in English ('look up', 'put up'), Sanskrit has many verbs that include, besides their roots, one or more prefixes. In the Vedic language, though not in Classical Sanskrit, these prefixes are separable from the verbal root. Syntactically, therefore, they must be thought of as separate entities. However, the semantics and subcategorization of the combination of root-plus-prefix is not always predictable. For instance, the root *jñā* means 'know' and is a simple transitive verb; the basic meaning of the adposition *ānu* is 'after', and it also governs the accusative. The combination *ānu-jñā*, however, means 'grant, concede, permit', and is bi-transitive, taking both an accusative and a dative complement. Since the semantics and subcategorization of phrasal verbs are often non-compositional, they must be defined as lexical, i.e. Ø-Bar categories (cf. Gazdar et al. 1985:33); but the morphological bond between root and prefix(es) is transparent to the syntax, since root and prefix(es) can be separated; cf. (7)-(8) below beside (9). I therefore will adopt Farkas' 1986 analysis of phrasal verbs in Hungarian, in which a Ø-Bar category must be allowed to branch. Throughout this paper, when a finite verb occurs with a prefix (and they are adjacent to each other), they will be hyphenated as in (9).

(7) śíkṣeyam it mahayatē divé-dive rāyāḥ ā kuhacidvidē
V - 'send' PTCL 'rejoicing'-D 'daily' 'riches'-A Pfx. 'finding it
somewhere'-D
'I would send riches daily to the one who, rejoicing, finds it
somewhere.' (RV 7.32.19)

- (8) *ā ha vai asmin svāḥ ca niṣṭyāḥ ca śamsante*
 Pfx. PTCL 'him'-L 'his own'-Np. '&' 'strangers'-Np. '&' V - 'place trust'
 'In him both his own (relatives) and strangers place their trust.'
 (ŚB1.6.4.17)
- (9) *ūt-grbhñīte vai eṣāḥ asmāt lokāt devalokām*
 V - 'raise oneself' PTCL 'he'-N 'this'-Ab 'world'-Ab 'god-world'-A
 'He raises himself from this world to that of the gods.' (ŚB 3.1.4.1)

1.2.3. Topicalization ⁷

In addition to basic ID rule schemata, an adequate description of Vedic constituent order requires a means of accounting for the syntactic behaviour of a class of words which I shall refer to as 'sentential particles' and which are labelled PTCL in the examples; cf. e.g. *it*, *vai* in (7), (9) above.

The majority of these particles are difficult to translate, since instead of specific information they communicate nuances relating to speaker attitudes, etc.⁸ Many of the glosses in (10)-(17) below therefore are only approximate and, except in this section, PTCLs will be left unglossed (except for conjunctions like *ca* 'and'). What is important is that, like Wackernagel's-Law clitics, they occupy the second position in their mother category, 'second position' being defined as 'immediately following the first lexical item.' As can be seen from (10)-(11), these particles cannot occur in clause-initial position, nor can they be separated from the left boundary of their mother by more than one word.⁹

- (10) (a) *tām tú naḥ āgatām prati-prá-brūtāt*
 ACCfem. PTCL cl. ACCfem.(part.) V 2s.impv.
 DEM 'but' 1p.pro. 'come' 'announce'
 'But announce her to us as having come = when she has come.'
 (ŚB 3.2.1.22)
- (b) **tú tām naḥ āgatām prati-prá-brūtāt*
 'but'
- (c) **tām naḥ tú āgatām prati-prá-brūtāt*
 'but'
- (d) **tām naḥ āgatām tú prati-prá-brūtāt*
 'but'
- (11) (a) *prajāpatiḥ khálu vai tásya veda*
 NOM P T C L GEN V 3s.pres.
 'P.' 'now' 'indeed' DEM 'know'
 'Now, Prajāpati indeed knows about that.' (TS 2.1.6.5)
- (b) **khálu vai prajāpatiḥ tásya veda*
 'now' 'indeed'

As shown in (12)-(14), the word preceding the particle string often corresponds to a gap (represented by \mathfrak{I}) to its right. Such a word will henceforth be said to be 'topicalized'.

- (12) brahma_i ca vai idam agre [t_i subrahma ca]_{NP} āstām
 NOM PTCL Adv LOC NOM PTCL V 3d.impf.
 'B.' '&' 'now' 'here' 'beginning' 'S.' '&' 'were'
 'Now in the beginning, there were here Brahman and Subrahman.'
 (ŚB 1.1.1)
- (13) dviṣāntam_i ha asya tát [t_i bhrātrvyam]_{NP} abhi-āti-ricyate
 ACC PTCL GENcl. NOM ACC V 3s.pres.
 'hateful' 'now' 3s.pro. DEM 'foe' 'remain for'
 'That now remains for his hateful foe.' (ŚB 1.9.1.18)
- (14) indhē_i ha vai etāt adhvarýuḥ [idhména agnīm t_i]_{VP}
 V 3s.pres. PTCL PTCL Adv. NOM INST ACC
 'ignite' 'now' 'indeed' 'now' 'A.' 'kindling' 'fire'
 'Now the Adhvaryu indeed lights the fire with the kindling.'
 (ŚB 1.3.5.1)

The clause-initial, pre-PTCL words in (10)-(11) would be clause-initial even without the PTCL string, but it will simplify the description of the syntax of particles if (10)-(11) are also assumed to include gaps immediately to the right of the PTCL strings. It is then possible to state that the PTCL string always has two sisters, one a Bar \emptyset item to its left, the other a constituent dominating a gap corresponding to that Bar \emptyset item. This generalization can be adequately stated in formal terms by ID rule schema (15) and LP rule (16).

- (15) $X \rightarrow Y[\text{BAR } \emptyset], \text{PTCL}, X/Y[\text{BAR } \emptyset]$
 (16) $[\text{BAR } \emptyset] < \text{PTCL} < [\text{SLASH: BAR } \emptyset]$

The vast majority of particles have clausal scope. For these, the category denoted by X in ID rule schema (15) is S. In order to clarify the distinction between particles that have exclusively clausal scope and those that are not so restricted, I shall in all subsequent examples mark each PTCL either 'S' if it has exclusively clausal scope or 'P' if it does not.

1.2.4. Scrambling and evidence for hierarchical structure

Freedom of constituent order, or freedom to generate discontinuous constituents, is a frequently-remarked-upon characteristic of Sanskrit and other early IE languages. Much of the discontinuity found in Sanskrit results from fronting processes such as topicalization and the fronting of pronominals (to be discussed in the rest of this paper), or from other syntactic phenomena which appear to be independently motivated. There remains however a residue of strings whose discontinuities cannot be accounted for by any of these independently-motivated phenomena, but solely by the fact that the grammar does not forbid them. Such strings may be said to be 'scrambled'. Cf. (17)-(18). The

(a) strings are the ones actually attested. The unscrambled counterparts are given in the (b)-version.

- (17) (a) purástāt mithunám prajānanam kriyate
 'at the beginning' 'union'-N 'procreation'-N 'is made'
 sāmīdhenīnām
 'kindling'-G
 'At the beginning a union, a procreation of the kindling is made /
 is made of the kindling.' (ŚB 1.4.1.2)

(b) purástāt [sāmīdhenīnām mithunám prajānanam]_{NP} kriyate

- (18) (a) tasya daśa avastāt ahāni divākīrtyasya bhavanti
 DEM-G 'ten'-N 'before'-Adp.(G) 'days'-N G 'are'
 'Before the Divākīrtya there are ten days.' (AB 4.18.4)

(b) [tasya divākīrtyasya avastāt]_{PP} [daśa ahāni]_{NP} bhavanti

I hope to present elsewhere my conclusions regarding the best mechanism for describing this sort of discontinuity. Here I will merely state that it involves a 'wrapping' operation similar to that discussed in Pollard 1984 and Zwicky 1986. The discontinuous constituent (e.g. the bracketed NP in (17b)) is 'wrapped' around another, or two constituents (e.g. the bracketed PP and NP in (18b)) are 'wrapped' around each other.

For the present paper, the issue of 'scrambling' in Vedic is important primarily because it offers circumstantial evidence for hierarchical structure. There appear to be certain constraints on scrambling in Vedic. First of all, some constituents scramble more easily than others. NP-Scrambling appears to be fairly common in all registers of the corpus. PP-Scrambling is much rarer; (18) is the only example I have so far come across in Vedic Prose, and even in the thousands of verses of the R̥g-Veda I have found only a dozen or so. VP-Scrambling seems to be rarest of all; I have so far found at most a handful in the entire corpus. Furthermore, there appears to be an even stronger constraint on what might be called 'Multiple Scrambling', the scrambling of a constituent which includes a scrambled daughter. Thus, even though NPs in general appear to Wrap more easily than PPs, if an NP contains a PP that is itself scrambled, that NP is extremely unlikely to be scrambled. For some further discussion, see Schäufele 1988, to appear.

These constraints seem to me significant, albeit circumstantial, evidence for hierarchical structure. Since their description appears to necessitate reference to such notions as NP, PP, and VP, it follows that such labels must refer to something real in the grammar. And since NPs, PPs, and VPs can all dominate NPs (cf. ID rule schemata (3)-(5)), it must be possible for NPs not to be immediate daughters of S.

2. Pronominal fronting

2.1. General description

NPs can be generated as daughters of any phrasal constituent. It is characteristic of Sanskrit that any NP may 'control' (in the sense of requiring agreement in gender, number, and case) a pronominal determiner, whether demonstrative, interrogative, or relative.

All Sanskrit relative pronominals (based morphologically on the stem *yá-* and hereafter abbreviated REL) and interrogative pronominals (based on the stem *ká-*, including the form *kím*, and hereafter abbreviated INT) belong to the syntactic class under discussion. But not all demonstratives do. Demonstratives in Sanskrit (hereafter abbreviated DEM) can be divided into two classes:¹⁰

(a) locational deictics (abbreviated 'IDEM'), members of the *idám* and *adáh* paradigms. These have primarily a directional sense — 'this here', 'that over there' — referring to entities in the objective world.

(b) discourse deictics (abbreviated 'dDEM'), more likely to be used to refer to items in the discourse context: 'that mentioned previously', 'the X about to be specified', etc. Discourse deictics are based on the stem *tá-*. I include here the non-neuter singular nominative forms in which /s/ substitutes for /t/, as well as those derived from the *tá-* stem by means of the prefix /e/. These latter differ from the prefix-less dDEMs in a tendency to have cataphoric reference: Whereas the referent of a prefix-less, 'anaphoric' dDEM is likely to be identified and/or defined in a previous clause, the referent of a prefixed, 'cataphoric' dDEM is likely to be identified and/or defined in a subsequent clause. Cf. Hock 1982:13-14 for details.

Of these two classes, only the dDEMs share with RELs and INTs the strong tendency to be fronted. Cf. (19), in which substituting dDEMs for the attested IDEMs results in highly marked strings unless the dDEMs are fronted.

- (19) (a) eṣāmiⁱ vai lokānāmiⁱ ayam^j evaⁱ vyomā^j
 IDEM-Gp. PTCL-S 'worlds'-Gp. IDEM-Nm. PTCL-P 'ether'-Nm.
 idam^k antarikṣam^k
 IDEM-Nn. 'atmosphere'-Nn.
 'Of these worlds the ether is this atmosphere.' (ŚB 5.1.2.5)
- (b) ?etēṣāmiⁱ vai lokānāmiⁱ eṣāh^j evaⁱ vyomā^j etāt^k antarikṣam^k
 dDEM dDEM dDEM
- (c) etēṣāmiⁱ vai eṣāh^j etāt^k lokānāmiⁱ evaⁱ vyomā^j antarikṣam^k
 dDEM dDEM dDEM

I am concerned here only with the pronominal lexemes (including pronominal lexemes serving adverbial functions) derived from the pronominal stems *yá-*, *ká-*, and *tá-* (all RELs, INTs, and dDEMs), and no other lexemes in the language. I shall for the present treat them as marked positive for a feature

AFP, for 'Accented Fronted Pronominal', although I suspect that this will eventually prove to be shorthand for a complex of features.

It is on this class of lexemes that the Vedic equivalent of 'WH-fronting' is defined. In Vedic (though not in the Classical language), AFPs are normally fronted within the clause; they are only rarely found associated in c-structure with the NPs that nevertheless control them. See (20)-(23), in which the superscripts indicate morphological control.

- (20) (a) tauⁱ vr̥hiḥ ca eva yavaḥ ca
dDEM-Nd. 'rice'-Ns. PTCL-'&' PTCL-P 'barley'-Ns. PTCL-'&'
[bhūtau]ⁱ_{NP} ajāyetām
'beings'^{Nd.} 'were born'
'Rice and barley, these two beings were born.' (AB 2.11.12)
- (b) ?vr̥hiḥ ca eva yavaḥ ca tauⁱ bhūtauⁱ ajāyetām
- (21) (a) yābhyaḥⁱ eva tāni^j [devatābhyaḥⁱ]_{NP} [havīṃṣi]_{NP}
REL-D PTCL-P dDEM-N 'deities'-D 'oblations'-N
gr̥hītāni bhavanti
'taken' 'are'
'For which deities those oblations are taken' (AB 7.2.3)
- (b) ?tāni^j havīṃṣi^j yābhyaḥⁱ eva devatābhyaḥⁱ gr̥hītāni bhavanti
- (c) ?yābhyaḥⁱ eva devatābhyaḥⁱ tāni^j havīṃṣi^j gr̥hītāni bhavanti
- (22) (a) kātiⁱ ayám adyá udgātā́ [[asmín]^j yajñé]_{NP}
INT-Adv. IDEM-Ns. 'today' Ns. IDEM-Ls. 'sacrifice'-Ls.
[stotriyāḥⁱ]_{NP} stoṣyati]_{VP}
Ap. 'sing'
'How many stotriyas will this Udgātṛ sing in this sacrifice today?'
(ŚB 14.4.6.12)
- (b) ?ayám adyá udgātā́ asmín yajñé kāti stotriyāḥ stoṣyati
- (23) (a) táthā u ha etámⁱ eśáḥ^j atiyántamⁱ agníḥ^j
Adv.-AFP PTCL-S dDEM-A dDEM-N 'passing by'-A 'fire'-N
dhúryaḥ ná hinasti.
'assoc.w.yoke'-N 'not' V-'injure'
'Then this fire in the yoke does not injure the one passing by.'
(ŚB 1.1.2.10)
- (b) ?táthā u ha etámⁱ atiyántamⁱ eśáḥ^j agníḥ^j dhúryaḥ ná hinasti.
- (c) ?táthā u ha eśáḥ^j agníḥ^j dhúryaḥ etámⁱ atiyántamⁱ ná hinasti.

In trying to account for this behaviour, I will start by assuming the LP rule in (24), which will guarantee that AFPs will precede any non-pronominal sisters.

(24) +AFP < -PRO

2.2. Some complications

2.2.1. Interaction between distinct fronting processes

2.2.1.1. Pronominal fronting and topicalization

The ordering of AFPs is complicated by two independent features of Vedic syntax. One is topicalization. As is evident from (25)-(26), AFPs may be preceded by the clause-initial PTCL string and its left sister, the 'topicalized' word. According to the proposed formal description of PTCL syntax (cf. above, (18)-(19)), however, these two elements are sisters of S[SLASH], not of any lexemes. If the AFPs in (25)-(26) are assumed to be immediate daughters of S[SLASH], then LP rule (24) will front them therein, but will not refer to the PTCL string or the topicalized word, since these are aunts, not sisters, of the AFPs.

(25) sárvam_i u evá eṣáḥ etát [sapátnānām t_i]_{NP}
'all'-A PTCL-S PTCL-P dDEM-N 'thus' 'enemies'-G

sám-vṛñkte

'appropriates'

'On the other hand, this (person) thus appropriates in fact his enemies' all = all, in fact, his enemies' goods.' (ŚB 1.7.2.24)

(26) indhé_i ha vaí etát adhvarýúḥ [idhména agním t_i]_{VP}
'ignites' PTCL-S dDEM-Adv. 'A.'-N 'kindling'-I 'fire'-A

'Now the Adhvaryu indeed lights the fire with the kindling.'

(ŚB 1.3.5.1)

2.2.1.2. Pronominal fronting and clitic pronouns

The ordering of AFPs is also complicated by clitic pronouns. Clitic pronouns in Sanskrit are obligatorily unaccented personal pronouns having, unlike most AFPs, the syntactic status of full NPs.¹¹ Being unaccented, clitic pronouns require phonological hosts and are subject to phonological constraints on their ordering within the clause. In Vedic verse it is possible for a clitic pronoun to cliticize to its governor (case-assigner) or to appear at the end of a clause or metrical unit. (A phonological constraint operating throughout the history of Sanskrit requires that the first word in a clause or metrical unit be accented, and since clitic pronouns cannot be accented, they are ipso facto excluded from such positions.) In Vedic Prose they can appear only in the position immediately following the first word in the clause and the PTCL string, if any. They necessarily precede any AFPs following the PTCL string. Cf. (27)-(28).

- (27) (a) *vṛtrám hí asmai etátí jaghnúṣe*
 A PTCL-S 'him'-Dcl. dDEM-A 'having slain'-D
āpyāyanamí ákurvan
 'envigorating draught'-D 'made'
 'For him, (the one) having slain Vṛtra, they prepared this
 energorating draught.' (ŚB 1.6.4.12)
- (b) **vṛtrám hí etátí asmai jaghnúṣe āpyāyanamí ákurvan*
- (28) (a) *té enam etátí vratámí upayántam viduḥ*
 dDEM-Np. 'him'-Acl. dDEM-As. 'vow'-A 'undertaking'-A 'know'
 'They know him (to be) the one undertaking this vow.'
 (ŚB 1.1.1.7)
- (b) **té etát enam vratám upayántam viduḥ*
- (c) **té etát vratám upayántam enam viduḥ*

The ability of clitic pronouns to precede AFPs in strings like these is accounted for by the fact that they are +PRO, and LP rule (24) constrains AFPs only to precede -PRO sisters.¹²

2.2.2. Double determiners

In special cases, one NP can in Vedic control two determiners. It can control one determiner of any type, and in addition one of any of the following types: one REL, one dDEM, or one INT. Cf. (29)-(30). In order to account for strings such as this, it is necessary to assume that a given NP may control as many as two distinct determiners.

- (29) *etamí ha vai etamí nyaṅgamí anu garbhaḥ*
 dDEM-A PTCL-S dDEM-A 'sign'-A 'according to'-Adp.(A) N
 'In accordance with this same sign is "garbhaḥ".' (JUB 1.1.4.2)
- (30) [*sáḥí eśáḥí evá mṛtyúḥí*] [*yáḥí eśáḥí*
 dDEM-Nm. dDEM-Nm. PTCL-P 'death'-Nm. REL-Nm. dDEM-Nm.
etásminḥ mánḍaleḥ púruṣaḥí], átha [*etát^k amṛtam^k*
 dDEM-L 'orb'-L 'person'-Nm. COMP dDEM-Nn. 'immortality'-Nn.
[yát^k etát^k arcíḥ^k dípyate]
 REL-Nn.dDEM-Nn. 'light'-Nn. 'shines'
 'Which this person is in that orb, that very one is death, and which this
 light shines, that very one is Immortality = That very person in that orb
 is death, and this shining light is immortality.' (ŚB 10.5.2.3)

A specialized usage exists for a double REL, meaning approximately 'whichever', answered by a double dDEM. In general, doubling any word

results in a 'distributive' or intensive meaning. See below, ex. (31)-(32). Such doublings can almost certainly be considered (quasi-)lexicalized.

- (31) yamī yamī nu eva aham abhi-ava-īkṣiṣye, tena tenaī
REL-A PTCL-S PTCL-P 'I'-N 'look at'-fut. dDEM-I
eva me saha bhaviṣyati
PTCL-P 'mine'-cl. 'with'-Adp.(I) 'become'-fut.
'Whomever I will look at with that one together will be mine.' (JB 17)
- (32) tāti tāti ānādiśya ājyasya evā rūpeṇa grhṇāti
dDEM-A 'without announcing' 'butter'-G PTCL-P 'form'-I 'takes'
'Each one he takes with (= in) the form of butter without announcing
(it).'
- (ŚB 1.3.2.7)

2.2.3. Non-fronted determiners

This paper will be primarily concerned with fronted determiners. It must not be thought, however, that the fronting of these determiners is absolutely obligatory in Vedic, any more than the fronting of WH-words is obligatory in English. While RELs, INTs, and dDEMs have a strong tendency to be fronted, strings with non-fronted determiners do occasionally occur. Cf. (33).

- (33) ?téi devāḥi etátī yājuḥī apaśyan
dDEM-Np. 'gods'-Np. dDEM-As. As. 'saw'
'The gods saw this Yajus.' (TS 5.2.3.1)

In this clause, since the pronoun *etátī* is just as much a member of the dDEM-class (and therefore of the AFP-class) as *téi*, we would expect the two demonstratives to be next to each other as in (33'), rather than next to their respective controllers. Yet this is not the case.

- (33') téi etátī devāḥi yājuḥī apaśyan
dDEM dDEM

Strings such as (33) are quite rare in the Vedic Prose corpus (hence the question mark qualifying (33)), yet they do occur.

The problem with which this paper is concerned is this: With regard to constituent order, AFPs generally behave as immediate daughters of S, being free to be fronted within S rather than NP; but with regard to morphology they behave as daughters of NP, in that they can be controlled for purposes of morphological agreement by any NP in the clause.¹³ A descriptively adequate theory of Sanskrit needs to account for this discrepancy.

2.3. Some proposed solutions

2.3.1. Pruning in semantics

Some (e.g. Arnold Zwicky, Georgia Green, pp.c.) have suggested that this problem could be solved semantically: Allow AFPs to be freely generated as

daughters of S, with any agreement marking conceivable, and let the semantics sort out which strings are acceptable. This is a logically possible solution, consistent also with Chomsky's (1988) recent assertion that grammars generate huge amounts of 'garbage' (in the sense of unacceptable strings) anyway, and it's the job of semantics to eliminate it. In Chomsky's view a grammar (or a theoretical framework for grammar) cannot be faulted for failing to do the pruning job that can be left to semantics.

This proposed solution, however, is only adequate if all of the relevant features are accessible to semantic analysis, and in the case of Sanskrit determiners this is dubious at best. In Sanskrit, there are three agreement features necessary for pronominal determiners, gender, number, and case, illustrated below, (34)-(36). (See the explanation of abbreviations for these features at the end of the paper.)

- (34) (a) etām^l u evá eśáhⁱ etásmai^k viṣṇuḥ
dDEM-Af. PTCL-S PTCL-P dDEM-Nm. dDEM-Dm. Nm.

yajñáh^l vikrāntim^l ví-kramati
'sacrifice'-Nm. 'victorious step'-Af. 'strides'
'This sacrifice, Viṣṇu, strides this victorious step for him.'
(ŚB 1.1.2.13)

- (b) *etām^l u evá etáⁱ etásmai^k viṣṇuḥ yajñáh^l
dDEM-Am. dDEM-Nn. dDEM-Dm. Nm. Nm.

vikrāntim^l ví-kramati
Af.

- (35) (a) tauⁱ vñhiḥ ca eva yavaḥ ca
dDEM-Nd. 'rice'-Ns. PTCL-'&' PTCL-P 'barley'-Ns. PTCL-'&'

bhūtauⁱ ajāyetām
'beings'-Nd. 'were born'
'Rice and barley, these two beings were born.' (AB 2.11.12)

- (b) saḥⁱ vñhiḥ ca eva yavaḥ ca bhūtauⁱ ajāyetām
dDEM-Ns. Nd.

- (c) teⁱ vñhiḥ ca eva yavaḥ ca bhūtauⁱ ajāyetām
dDEM-Np. Nd.

- (36) (a) tasyaⁱ daśa avastāt ahāni divākīrtyasyaⁱ
dDEM-G 'ten'-N 'before'-Adp.(G) 'days'-N G

bhavanti
'are'
'Before the Divākīrtya there are ten days.' (AB 4.18.4)

- (b) *saḥi daśa avastāt ahāni divākīrtyasyaⁱ bhavanti
 dDEM-N G
- (c) *tasmini daśa avastāt ahāni divākīrtyasyaⁱ bhavanti
 dDEM-L G

While gender and number might conceivably be regarded as semantic in nature,¹⁴ case is a purely grammatical feature with no direct relation to the nature of the referent. This is obvious from the fact that co-referential nominals in successive clauses can be in different cases, though they will almost certainly agree in gender and number. If semantics is unable to force co-referential nominals in different clauses to agree in case, I don't see how it can do so within the same clause.

Case is also a purely grammatical feature in that it is assigned to NPs syntactically (whether by configuration or subcategorization), not freely. In a language like Sanskrit with a rich morphological case system, head nouns inherit their morphological case from their NP mothers. APs get case by agreement-control from their governing head nouns or from their NP mothers (depending on details of theoretical formalism), and the same procedure is routinely assumed for determiners. However, this assumption requires the further assumption that determiners are daughters of NP, and, as stated above, the problem with which this paper deals is precisely that in Vedic some determiners do not behave as daughters of NP with regard to constituent order. Either case must be assigned by the syntax to determiners independently of NPs, which seems like a violation of Occam's Razor, or the case assigned to NPs must somehow be also assigned automatically to their determiners, even when, in terms of constituent structure, these are not their daughters.

2.3.2. Subcategorization

Since verbs and adpositions have to subcategorize for their arguments in terms of case, it might be asked, Cannot this constraining mechanism be extended in order to solve the problem that morphological case agreement poses for semantic pruning, as discussed in the previous section?¹⁵

With regard to determiners agreeing with subcategorized arguments, the assignment of case as a result of subcategorization might be extended in such a fashion in an HPSG-type theory with little trouble (cf. Pollard & Sag 1987). Within GPSG, in which subcategorization requirements must be filled by sisters (Gazdar et al. 1985:33-34), such an extension might prove formally more difficult. But I am not going to address this problem in detail, because in view of the problem discussed in the following paragraph, the proposed extension is itself clearly inadequate.

It is assumed that verbs and adpositions subcategorize for their arguments (with the exception in GPSG of subjects, which are not sisters of lexical verbs — cf. Gazdar et al. 1985:34). But it is also assumed that verbs do not subcategorize for VP adverbials, even though such do occur.¹⁶ As noted above, 1.2.1.2.,

adverbials can take the form of oblique-case NPs. Such NPs may control determiners which may be fronted. Cf. (37).

- (37) *etām*ⁱ *u* *evā* *eṣāḥi* *etāsmāi*^k *viṣṇuḥ*
 dDEM-Af. PTCL-S PTCL-P dDEM-Nm. dDEM-Dm. Nm.
 [yājñāḥ]ⁱNP [[ə^k]ⁱNP [vikrāntim]ⁱNP ví-kramati.]_{VP}
 'sacrifice'-Nm. 'victorious step'-Af. 'strides'
 'This sacrifice, Viṣṇu, strides this victorious step for him.'
 (ŚB 1.1.2.13)

In (37) we have an AFP determiner *etāsmāi* controlled by a (phonologically null) dative NP adverbial modifying the VP. While it does subcategorize for an accusative direct object ((*etām*) *vikrāntim* in (52)), I have no reason to believe that the verb *ví-kram* subcategorizes for a beneficiary-dative NP. The fact that NPs which do not get case by subcategorization can themselves control, for the purposes of case-agreement, AFP determiners indicates that subcategorization itself cannot adequately account for case-agreement on AFP determiners.

2.3.3. Extraction

One possible solution that immediately springs to mind is to have all AFPs extracted from any phrasal mother into S by means of SLASH.¹⁷ It would certainly be possible to define instantiations of SLASH with appropriate pronominal values, so that there could be ID rules such as those in (38)-(43).

- (38) S → AFP[x], NP[x]/AFP[x], VP
 (39) S → AFP[x], NP, VP/AFP[x]
 (40) VP/AFP[x] → V, NP[x]/AFP[x]
 (41) VP/AFP[x] → V, NP, PP/AFP[x]
 (42) PP/AFP[x] → P, NP[x]/AFP[x]
 (43) NP[x]/AFP[x] → N[x], AFP[x]/AFP[x]

There are two major problems with this hypothesis. One involves the possibility of VPs dominating two or more NPs, each of which may control a demonstrative. For example, (44) below might be analyzed as a case of extraction along the lines of (44').

- (44) *etāt*ⁱ *ha vai* *devāḥ* *vratām*ⁱ *caranti*
 dDEM-As. PTCL-S 'gods'-Np. 'vow'-As. 'undertake'
 'The gods undertake this vow.' (ŚB 1.1.1.5)
 (44') [etātⁱ]_{dDEM} *ha vai* [dDEM/dDEM devāḥ] [[dDEM/dDEM
 vratāmⁱ]_{NP/dDEM} caranti]_{VP/dDEM}]_{S/dDEM}

2.4. Attempt at a GPSG description²¹

2.4.1. GEND, NUM, & CASE are Foot features

In attempting a GPSG solution to this problem, I begin by proposing that the necessary agreement features for AFPs, namely GEND, NUM, and CASE, are all Foot features, meaning that, whenever any of them are instantiated on any category, they must 'percolate up' to that category's mother, along with their instantiated values. (Cf. Gazdar et al. 1985:78-83.)

Designating such inherently nominal features as GEND and CASE as Foot features means instantiating them on -N categories such as VP, which is contrary to general intuitive notions of the nature of such categories. But it does get the necessary agreement features where we need them for control of AFPs in S from VP-internal NPs. For instance, a VP node dominating a direct object NP would be marked with the agreement features appropriate for that NP, and it would be a simple matter to generate an AFP to agree therewith.²²

Problems arise, however, when a given node (say, VP) has to be marked with conflicting values for one or more agreement features. For instance, in (37), according to this hypothesis the VP node must for the sake of the direct object be marked [GEND:F; CASE:ACC]; but for the sake of the indirect object-beneficiary, in order to generate the Demonstrative *etásmai*, it must also be marked [GEND:M; CASE:DAT].

Clearly, if a VP node is to bear a variety of instantiations of agreement features, one for each NP it dominates, all of these must somehow be segregated from each other as values for different features, in order to be equally available to the system while not conflicting with each other.

2.4.2. Annotation of NPS

To segregate distinct instantiations of agreement features from each other within a single category, I propose encapsulating each such instantiation within an intermediate category (= bundle of feature values), cross-referenced to the relevant NP. These capsule-categories might be arbitrarily labelled, but the simplest and most direct way to label them is probably by labels relating to grammatical relation or function. If we assume something like the LFG principle of functional uniqueness (Bresnan 1982:181-182), a designation by grammatical function will necessarily refer to a unique NP. In which case, any arbitrary method of distinctively labelling NPs will in fact be equivalent to every other such possible method, including labelling by grammatical function. And labelling by grammatical function is at least mnemonically convenient.²³

To present the details of this hypothesis, I will first specify some definitions.

An UNDEFINED feature is one which does not occur within a given category. (Cf. Gazdar et al. 1985:ch.2 passim.) An UNSPECIFIED feature is one which is defined for a given category, but to which no value is assigned by that category. For example, a given category might have the feature CASE defined but unspecified, which I will notate as [CASE: ***]

There is a feature-set GF of all the possible Grammatical Functions (à la LFG or RG) in a given language (in this case, Vedic), hereafter referred to as GF-features.

Each GF-feature is a CATEGORY-VALUED FEATURE, taking typical NP-type values. (The necessary agreement features for AFPs are the most important ones for our discussion, but values such as \pm HUMAN or \pm ANIMATE may also be relevant to a given language.)

Each GF-feature is a Foot Feature.

A SET-VALUED FEATURE is one which takes as its value a set of features.²⁴

There is a Set-Valued Feature RELAT, whose value is always a subset of GF. Verbs and adpositions have the feature RELAT as part of their lexical entries, and their subcategorization frames may be defined thereby (cf. below).

Since verbs and adpositions assign case to their nominal complements (i.e., a given verb or adposition can collocate only with an NP marked for a specific case, not any case), their lexical entries would need to specify the value of the feature CASE on their NP-complements. Since under this hypothesis the necessary features of NP-complements would be coded in RELAT, this would be the appropriate place to code this information. Since, however, verbs and adpositions generally have no constraints on the grammatical number or gender of their NP-complements, there would be no reason to specify this information in RELAT in the lexicon.

For example, a verb like *ánu-jñā* 'grant' may have in the lexicon a value of RELAT as in (47).

- (47) [RELAT: IO [GEND: ***], DO [GEND: ***]]
 | | NUM: *** | | NUM: *** ||
 | | CASE: DAT] | | CASE: ACC]]

This example, by the way, should make clear how a set-valued feature is different from a category-valued feature. The value of each of the GF-features IO and DO is a category, that is, it is a set of features of the form {a, b, c, d, ...} such that each feature is distinct from the others: GEND is a distinct feature from NUM which is distinct from CASE. This particular instantiation of RELAT, however, includes in its value set two instantiations apiece of the features GEND, NUM, and CASE, and the two instantiations of CASE, for instance, each being assigned a different value, would conflict (i.e., be incompatible) with each other were they not clearly distinguished by being encapsulated in distinct categories.

A verb or adposition's subcategorization frame could be defined in terms of its lexical RELAT value if we adopt the following stipulation: At the phrasal level, no unspecified features would be allowed. This means that any VP or PP category must dominate, in addition to its Head, the NPs that will provide actual values for features such as GEND and NUM which are not specified by the Head's RELAT value.

Thus, the RELAT feature lexically assigned to any verb or adposition would encapsulate everything that needs to be specified by the customary understanding of such a controller's 'subcategorization frame', and the prohibition against unspecified features at the phrasal level will guarantee that the 'subcategorization frame' must be filled.²⁵

RELAT is also defined for NPs, taking as its value a single GF. A GF α in RELAT can get its values for GEND and NUM from an NP whose own RELAT value is α .²⁶

Since RELAT is a Foot feature, the GF-features for any NP within VP or PP will percolate up to the mother-node, along with their values for the necessary agreement features. AFPs can then be generated in agreement with these GF-features as shown in Figs. 1a, 11a, 111a, at the end of this paper. Similar strings with AFPs that do not agree with the agreement features instantiated in any of the GF-features under S, such as those in (34b), (35b-c), and (36b-c), would be ungeneratable.

For convenience, I will continue to describe an AFP generated in agreement with features in a given GF-feature as being controlled by the nominal bearing that GF feature, whether they are sisters or not.

2.5. An LFG description

I will maintain in the LFG analysis the conclusion reached in 2.3, that AFPs are generated as daughters of S, while still being controlled by NPs which may or may not be their sisters. So the question once again is, How are AFPs controlled?

The precise LFG form of ID rule schema (2') would probably be something like (2''), where X is a variable over the set of functions that can be assumed by NPs. This means that an AFP can be generated immediately dominated by S but functioning as the determiner for any NP within the clause, whether an immediate daughter of S or not.

$$(2'') \quad S \rightarrow (AFP)^*, \quad NP, (Adv)^*, VP \\ (\uparrow X \text{ DET} = \downarrow) (\uparrow \text{SUBJ} = \downarrow) \quad (\uparrow = \downarrow)$$

In f-structure, each AFP determiner, along with its value for GEND, NUM, and CASE, must be merged into the f-structure of the NP whose determiner it is identified as by its functional annotation.²⁷ LFG has a requirement called the consistency condition, which prohibits conflicts in the value of any feature within a particular f-structure.²⁸ Thus, in the f-structure the GEND, NUM, and CASE features of an AFP determiner would be expected to merge with those of the NP it determines, which they could do only if their respective values did not conflict. Were there a conflict, the f-structure would be ill-formed.

The result can be seen in Figs. 1b, 11b, and 111b at the end of this paper, which represent LFG analyses corresponding to the GPSG analyses represented in Figs. 1a, 11a, and 111a. Although in the LFG analyses the determiners

appear in c-structure independent of the nominals they determine, they are included within those same nominals in f-structure. Their agreement therewith in all relevant features is therefore guaranteed by the consistency condition, while the variants in (34b), (35b-c), and (36b-c) would be likewise rejected.

2.6. Problems with the GPSG description

So far, the GPSG analysis described in 2.4 may be able to describe the data under consideration. However, it requires many stipulations (in addition to the stipulation that an NP in Sanskrit may control two determiners, which is a language-specific stipulation required in any case) the content of which in the LFG analysis follows directly from the general assumptions of the framework.

The proposed GPSG analysis requires:

- (a) a distinction between undefined, unspecified, and null feature specifications;
- (b) a distinct category-valued feature for every GF possible in a given language;
- (c) a new type of feature: 'set-valued';
- (d) a set-valued feature RELAT, defined for every $V\emptyset$, $P\emptyset$, VP, PP, and NP;
- (e) the stipulation that the set-valued feature RELAT, the individual GF-features that make it up, and the features that make up the feature-matrix of each GF-feature are all Foot features;
- (f) the stipulation that unspecified features are not allowed at the phrasal level;
- (g) the assumption that a GF-feature within a given RELAT feature that happens to be part of the feature-matrix of an immediate daughter of S is able to control agreement on an AFP.

All of these stipulations are required merely to account for phenomena in a single language; there is no reason to believe that they would be of any use in the grammar of any language other than Vedic Sanskrit. They are, in fact, just as much language-specific stipulations as the stipulation that an NP may control two determiners. In an LFG framework, however, they are unnecessary, since their consequences are provided for by a distinct level of analysis, f-structure, which is not a language-specific stipulation but a fundamental and general part of the theory.

There are further problems, however, with the GPSG analysis that incline me all the more to conclude that LFG is better able to account for the data.

For one thing, the GPSG analysis requires that, in describing a string like (34) or (48) which include dDEMs without overt controlling NPs but with clear nominal referents, an NP be generated that is phonologically null but carries all

the feature specifications necessary for generating of the appropriate determiners. Cf. Figs. IIa and IIIa. The analysis requires that in every case involving the generation of an AFP two distinct nominals be generated which agree with each other in all relevant features, in spite of the fact that one of them may be devoid of any overt phonological form expressing those features. This is certainly a logical possibility, but is clearly inelegant, since it calls for a multiplicity of types of 'empty categories' in either the grammar or the lexicon.

- (48) evám evá eṣāhī etám| əi pāpmāne dviṣatē bhrātrvyāya
 'thus' PTCL-P dDEM-N dDEM-A 'evil'-A 'spiteful'-D 'foe'-D
 vajrām| út-yachati
 'thunderbolt'-A 'raises against'
 'Thus he raises this thunderbolt against the evil, spiteful foe.'
 (ŚB 1.2.4.3)

But in the LFG analysis while determiners may be separated from their NPs in c-structure they are still part of them in f-structure. Thus, in Figs. IIb and IIIb the f-structures of the phonologically null NPs 'get' the information about gender and number from the phonologically overt determiner and merely note the fact that there is no other phonological realization of these NPs (that's what 'PRED : PRO' means). Neither in c-structure nor in f-structure is there duplication of nominals. In this respect the LFG analysis is more elegant.

In addition to being monumentally cumbersome both in the amount of extra stipulations it makes and in the amount of extra information it forces into the analyses of specific clauses, the hypothetical grammar developed in 2.4 is liable to overgenerate.

At the end of 2.3 it was recommended that a descriptively adequate grammar of Vedic allow AFP determiners to be generated under S while allowing determiners to be generated under NP as well. The hypothetical grammar developed in 2.4 could generate a clause in which a given nominal simultaneously controlled an 'NP-internal' determiner and an AFP. See (49). (49a) is the actually-attested string, with the locative-case noun *loké* controlling a IDEM *asmín*. The hypothetical grammar discussed in 2.4 would also generate a string like (49b), in which the same noun is ALSO controlling a +AFP demonstrative within S; this is possible, though rare. Furthermore, the proposed GPSG analysis predicts the possibility of generating, within a given clause, an indefinite number of AFPs controlled by a single NP. There is nothing in the hypothetical grammar being discussed to prevent the generation of, say, three AFPs agreeing with the LOC NP *ias* in (49c). This might be rejected for semantic or pragmatic considerations, but given what has already been said (2.2.2.) about multiple determiners in Sanskrit, such considerations would probably not prevent the generation of something like (49d), or for that matter like (49e), in which *loké* controls two cataphoric dDEMs, one inside and one outside the NP it heads. As noted above (2.3.3, discussion of (45)-(46)), such strings do not occur in the corpus, and must therefore be assumed to be unacceptable. As is evident from (49f), however (cf. also (29) and (45)), (49e) would be rejected not because it involves two identical determiners controlled by one nominal (in

which case semantic or pragmatic considerations might be of help), but because one is dominated by NP while the other is not. Barring topicalization, both such determiners must be sisters.

- (49) (a) stómena vaí devāḥ [asmín loké]_{NP} ārdhnuvan
 'S.-I PTCL-S 'gods'-N IDEM-L 'world'-L 'prospered'
 'By means of the Stoma the gods prospered in this world.'
 (TS 5.2.1.6)
- (b) ?stómena vaí etásmin devāḥ [asmín loké]_{NP} ārdhnuvan
 dDEM-L IDEM-L L
- (c) *stómena vaí etásmin yásmin kásmin devāḥ [asmín loké]_{NP} ārdhnuvan
 dDEM-L REL-L INT-L IDEM-L L
- (d) *stómena vaí etásmin devāḥ [asmín etásmin loké]_{NP} ārdhnuvan
 dDEM-L IDEM-L dDEM-L L
- (e) *stómena vaí etásmin devāḥ [etásmin loké]_{NP} ārdhnuvan
 dDEM-L dDEM-L L
- (f) etásmin vaí etásmin stómena devāḥ [loké]_{NP} ārdhnuvan
 dDEM-L dDEM-L L

In an LFG analysis, however, the free generation of multiple determiners controlled by a same NP is prevented straightforwardly. The principle of functional coherence (cf. Kaplan & Bresnan 1982: 211-212) would guarantee that an NP will control at most one determiner, and therefore strings with multiply-determined NPs such as (69c-d) could not be generated. As noted earlier, it will be necessary to include in any adequate description of the grammar of Vedic Sanskrit a stipulation that an NP may control as many as two determiners. Within an LFG analysis such as I have been discussing, this would presumably take the form of a stipulation that an NP may control, in addition to the 'general' determiner we would normally expect, an optional 'second' determiner with, perhaps, a restricted range of types (cf. above, 2.2.2.).²⁹ Thus, the f-structure for any nominal would allow for a second determiner (DET2), whose existence would therefore not conflict with that of the 'general' determiner or result in functional incoherence (as long as it agrees completely in GEND, NUM, and CASE, of course). To demonstrate, I include an LFG analysis of (45) in Fig. IV at the end of this paper.

3. Conclusion

In this paper, I have attempted to develop and present an account of pronominal fronting in Vedic Sanskrit within the perspective of non-transformational generative grammar. Since my primary concern is with constituent order, I have within that perspective focussed most of my attention on the description of constituent structure (c-structure), a task for which GPSG has a wider and

better-defined range of tools. I have therefore adopted ID/LP format and SLASH-extraction to general non-transformational generative grammar.

In the course of the paper, I have argued that Relative, Interrogative, and certain Demonstrative Pronominals, as well as pronominal clitics, must be generated under S, even if they are controlled by NPs which are complements of -N governors and are therefore not their sisters.

In 2.4, I have tried to develop a strategy within a GPSG framework whereby AFPs (Accented Fronted Pronominals) can be controlled by NPs anywhere within the clause, including within VP or PP. I have argued that this necessitates a means of uniquely annotating each NP, and have suggested that, if such annotation is done on the basis of GFs, subcategorization frames may be definable in terms of such annotation.

My conclusion is that the GPSG framework may be able to describe the facts, but in order to do so must be burdened with a large number of extraneous and, in some cases, ad hoc features in the form of redundant null constituents and language-specific stipulations. And even so, the hypothesis seems to have problems with overgeneration. LFG on the other hand, endowed as it is with an (independently-motivated) extra level of analytic structure, can handle all the facts considered simply and straightforwardly, as explained in 2.5, once a few details of c-structure have been spelled out. I am therefore inclined to the view that LFG does a better job than GPSG in dealing with the problem of demonstrative-fronting in Vedic.

ABBREVIATIONS

AB = Aitareya-Brāhmaṇa
 JB = Jaiminiya-Brāhmaṇa
 JUB = Jaiminiya-Upaniṣad-Brāhmaṇa
 RV = Ṛg-Veda Samhitā
 ŚB = Śatapatha-Brāhmaṇa
 ŚB = Śaḍviṃśa-Brāhmaṇa
 TS = Taittirīya-Samhitā

1, 2, 3 = first, second, third person
 s., d., p. = singular, dual, plural number
 m., f., n. = masculine, feminine, neuter gender
 N, A, I, D, Ab, G, L = nominative, accusative, instrumental, dative, ablative,
 genitive, locative case
 pres., impf., fut., impv. = present, imperfect, future tense, imperative mood
 part. = participle
 pro., cl. = pronoun, clitic pronominal
 AFP = Accented Fronted Pronominal
 DEM, REL, INT = demonstrative, relative, interrogative pronominal
 dDEM, IDEM = discourse demonstrative, locational demonstrative

PTCL = particle

Adv, Adp. = Adverb, Adposition

Adp.(A), etc. = Adposition governing accusative, etc.

Pfx = verbal prefix

NOTES

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All Sanskrit words are represented in their 'pre-pausal' form, inter-word sandhi having been undone. Glosses include only information relevant to the text-context.

¹Zwicky 1986, p.c. has suggested that such annotations might be necessary even within a GPSG framework, though strictly on a local basis.

²Cf. Ford, et al. 1982:772: 'In a simple sentence [by which I assume they mean a single-predicate clause, without embedding], an argument of the lexical form of a verb is satisfied by any surface category that has the function specified for that argument, regardless of the surface position of that category.

³It should be noted that, in general, both the SLASH mechanism in GPSG and the double-arrow convention in LFG were developed to account for UNBOUNDED dependencies. There is, however, some question as to whether unbounded dependencies are possible in Sanskrit. Unbounded dependencies presuppose the possibility of unlimited embedding of clauses. But I have so far seen no good evidence in Sanskrit of embedded FINITE clauses. Sanskrit (at least Vedic Sanskrit) does recognize lexically and phonologically the distinction between (semantically) independent and subordinate clauses. But embedding, a normal strategy for 'clause-union' among modern Western European languages, is at best a marginal strategy in Sanskrit; finite clauses are almost never embedded. Sanskrit does have various kinds of non-finite 'reduced' clauses, which can be embedded in finite clauses (cf. Hock 1985). These appear to be islands in some cases but not in others, implying that the syntax treats them as either Ss (islands) or NPs (non-islands).

⁴I shall for the purposes of this paper ignore the nevertheless serious theoretical question of the true nature of adverbs as a syntactic category.

⁵We cannot subsume all of the NP cases together while excluding the Nominative case. Furthermore, if lexical adverbs are assumed to be [+N, +V, +ADV] while adpositions are assumed to be [-N, -V] (cf. Gazdar et al. 1985:21, 24), we cannot subsume AdvPs and PPs into one clearly defined category. Therefore, explicit reference to each of these categories would require that every category that admits of 'adverbial' daughters should have eight distinct ID

rule schemata associated with it, one for AdvP adverbials, one for PP adverbials, and one each for the six adverbial NP-cases. Even if, as seems arguable, adverbs and adpositions in Sanskrit should be subsumed into one lexical category type, this would reduce the necessary schemata only by one.

⁶For the details of control and agreement in GPSG, see Gazdar et al. 1985: 83-98. For LFG, note the definition of 'head' in Bresnan 1982:296, especially the assumption that 'the functional features of a phrase are identified with those of its head'. And, with regard to agreement in LFG, cf. Kaplan & Bresnan 1982: 183-215.

⁷Schäufele 1985 consists of a more detailed presentation of the hypothesis presented in this section.

⁸Kendall & Yoon 1986:54 describe similar elements in other languages as 'morphemes whose sole function is to indicate speech act properties'.

⁹As can be seen in (11),(12), and (14), PTCLs can 'pile up' to form a 'PTCL string'. The ordering of particles within the string appears to be controlled by phonological considerations which will not concern us here; cf. Hock 1982:11. Syntactically, it is the PTCL string itself that is important.

¹⁰Proulx (1988) has reconstructed two double sets of demonstratives for Proto-Algonquian. It is not clear whether the distinction between them is like that in Sanskrit.

¹¹Some clitic pronouns, such as *asya* or *asmai*, are homonymous with IDEMs, at least in the sense of having the same sequence of phonemes. However, they differ from these in two respects: (a) they are accentless, and (b) they behave syntactically and semantically as personal-pronominal NPs, rather than as NP-determiners or -modifiers or locational adverbs.

¹²Note that the hypothesis presented in 1.2.3. concerning topicalization and PTCL placement would assign to (27) a structure such as (27'), in which the clitic pronoun *asmai* ends up as the leftmost daughter of its mother. Since phonological constraints forbid clitic pronouns to appear in leftmost position, this can only be an adequate description of the true grammar if such intra-clausal constituent boundaries are invisible to the phonological component.

- (27') [vr̥trām_i hí [asmai etát_i [[[t_ijaghnuṣe]VP/N]NP/N
 'V.'-A PTCL-S 3s.pro-DATcl. dDEM-A 'having slain'-D(part.)
 āpyāyanam_i ákurvan]VP]SN]S
 'envigorating draught'-A 'prepared'
 'For him, (the one) having slain Vr̥tra, they prepared this envigorating
 draught.' (ŚB 1.6.4.12)

¹³This problem does not arise for AFPs which have adverbial functions (which in any case would be generated as instantiations of the category Adv),

since they are not controlled by any NPs. Such AFP adverbials will therefore not be at issue here.

¹⁴Though it might be difficult to make a hard-and-fast case for gender being a semantic feature in Sanskrit. Like German and French, Sanskrit has a grammatical gender system that does not always bear any obvious relation to 'natural' or 'semantic gender'. And it can happen that words of different genders can refer to the same real-world entity. Consider e.g. the words *ap* (fem.) and *udakam* (neut.), both meaning 'water'. The former presents some extra problems with regard to the assumption that even grammatical number is semantic in nature, since it is in Vedic normally (and in the Classical language always) used in the plural.

¹⁵For instance, in (36) the fact that a genitive demonstrative *tasya* is acceptable but not a locative *tasmin* is presumably due directly or indirectly to the fact that the adposition *avastāt* subcategorizes for a genitive rather than a locative complement.

¹⁶Cf. above, 1.2.1.2. for discussion of adverbials and (4) for the ID rule schema introducing VP adverbials.

¹⁷Or, conversely, to have determiners extracted and then have AFP features instantiated on them, similarly to the GPSG analysis of WH-fronting in English; cf. Gazdar et al. 1985:153-158.

¹⁸Examples of identical double determiners such as (29) are rare in the Vedic corpus, and those that occur are ambiguous with regard to fronting, since as in (29) the determiners' controlling nominal tends to follow the determiners immediately in linear order. While I have so far found no attested strings like (45), having identical double determiners fronted away from their controlling nominal (and therefore not only do I have to make up an example such as (45) but offer (46a) as a possibly acceptable alternative), I can confidently state that strings such as (46b) are unattested and therefore presumably ungrammatical.

¹⁹This hypothesis may actually create worse problems with regard to the syntax of clitic pronouns, given that these are obligatorily fronted in Vedic Prose (cf. 2.2.1.2.), and therefore would have to be extracted from their 'natural' mothers under all circumstances.

²⁰Note that we still need a category 'Det' under NP, to cover determiners, which are NOT fronted. It should also be noted that, given the apparent obligatoriness of clitic-fronting in Vedic Prose, the grammar should also guarantee that all clitic pronouns are generated under S, even though they may function semantically as verb- or adposition-complements or as genitive modifiers to NPs.

²¹A somewhat different, and much more elegant, description is possible within HPSG (cf. Pollard & Sag 1987). The analysis presented here within GPSG is not to be understood as representative of all GPSG-derived frameworks. I hope to address the question of an HPSG analysis of Vedic pronominal fronting in the near future.

²²Presumably AFPs can be assumed to be marked with an AGR feature into which the relevant information can be copied. I will not go into detail on this (cf. Gazdar et al. 1985:83-94 for the Control Agreement Principle and the operation of AGR features), but merely point out that the problem is getting the relevant features onto a sister (or mother) of the AGR-marked AFP.

²³Zwicky (1986:§6) has independently recommended that GPSG adopt at least a limited annotation of NPs for GF.

²⁴A 'set-valued feature' is rather like a 'list-valued feature' in HPSG except, of course, that it is unordered.

²⁵I distinguish between an 'unspecified' feature, i.e. a feature for which no value is specified, and a feature for which the value NULL is explicitly specified. I assume that all syntactic NPs, including NPs which are themselves phonologically null, have values for the features GEND and NUM specified. This may be an unwarranted assumption and a strike against this hypothesis; cf. 2.6.

²⁶The proposal presented in 2.4.2 has been criticized for leaving out of consideration NPs embedded in other NPs, which would complicate the details of the RELAT features for the NP mothers to the point of unwieldiness if not indescribability. For this reason, this proposal almost certainly would not work except for languages with little or no embedding in NPs. As noted earlier (note 3), there is not as much embedding in Sanskrit as in English. However, there is some (note that all versions of ID rule schema (3) include genitive NP modifiers dominated by NP), which is a further reason to suspect that in the end this proposal will prove inadequate.

²⁷See Kaplan & Bresnan 1982:191-193, 274 for the definition of the 'merge' operation, and 183-215 generally for the conditions on well-formedness of f-structures.

²⁸Cf. Grimshaw 1982: 96-97, Kaplan & Bresnan 1982: 181, 203-207, Neidle 1982: 399. Kaplan and Bresnan call it the 'Uniqueness Condition', but I find the name 'consistency condition' better reflects the gist of it. In a way, the consistency condition is the LFG equivalent of the constraint in GPSG that prevents two conflicting values for, say, NUM to be instantiated on one category. The crucial difference is that, like most well-formedness conditions in LFG, the consistency condition is defined on f-structure.

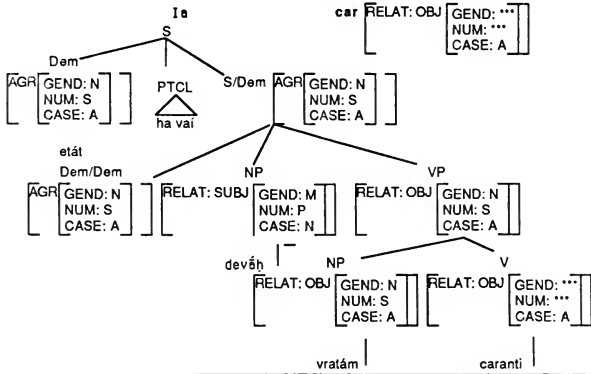
²⁹In order partly to make any type-restrictions on determiners explicit in analyses, I will define the feature 'TYPE' for each DET, taking values such as REL, dDEM-cat., dDEM-an., IDEM, or INT. A stipulation may still be necessary to insure that determiners of identical type that are 'sisters' in f-structure must also be sisters (barring topicalization) in c-structure. There are many details of the constraints on double determiners in Vedic that merit further research.

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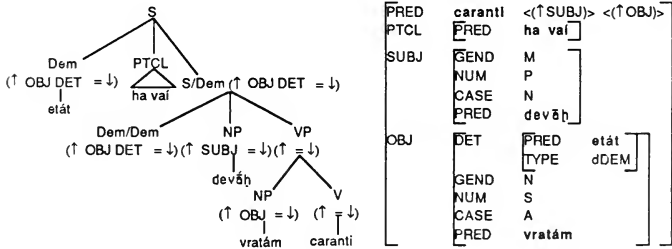
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etát ha vai devāḥ vratām caranti
 dDEM-As. PTCL-S 'gods'-Np. 'vow'-As. 'undertake'
 'The gods undertake this vow.' (SB 1.1.1.5)

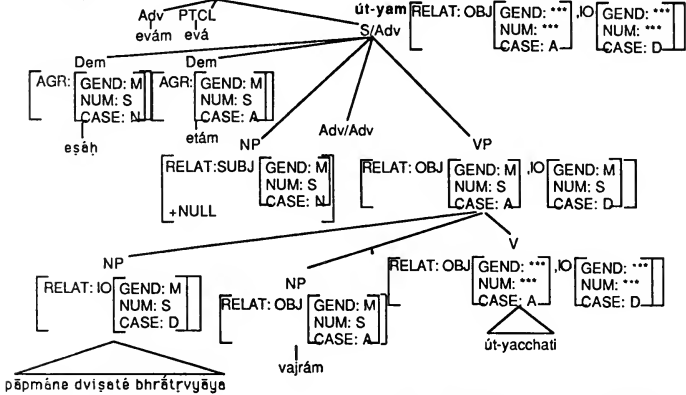


Ib.

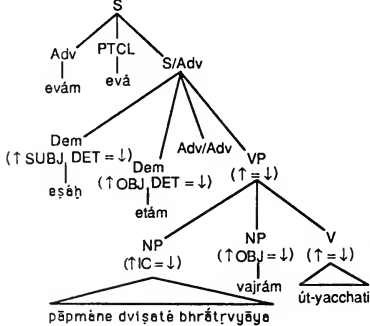


evám evá eṣāḥ etám pāpmāne dviṣetē bhrātr̥vyāye vajrām ut-yacchati
 'thus' PTCL-P dDEM-N dDEM-A 'evil'-D 'spiteful'-D 'foe'-D 'thunderbolt'-A 'raises at'
 'Thus he raises this thunderbolt against the evil, spiteful foe' (ŚB 1.2.4.3)

IIa.

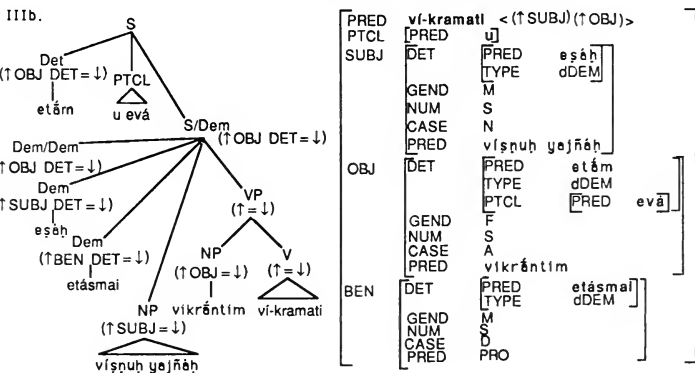
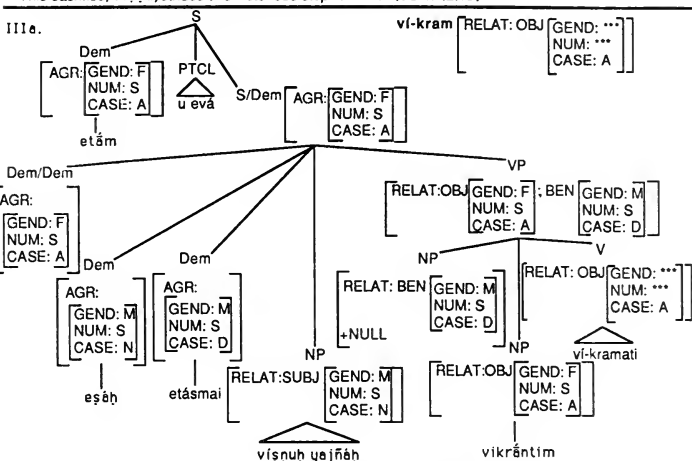


IIb.



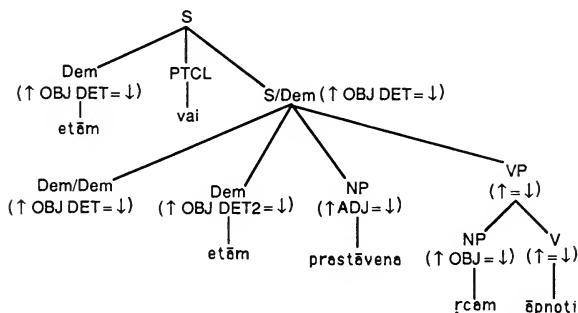
PRED	út-yacchati (↑SUBJ)(↑OBJ)(↑IO)
SUBJ	DET [PRED eṣāḥ TYPE dDEM]
	GEND M
	NUM P
	CASE N
	PRED PRO
OBJ	DET [PRED etám TYPE dDEM]
	GEND M
	NUM S
	CASE A
	PRED vajrām
IO	GEND M
	NUM S
	CASE A
	PRED bhrātr̥vyāye
	MOD pāpmāne dviṣete
ADJ	PRED evám
	PTCL [PRED evá]

etām u evā eṣāḥ etāsmāi viṣṇuḥ yajñāḥ vikrāntim vi-kramati
 dDEM-Af.PTCL-SPTCL-PdDEM-Nm.dDEM-Dm:V.-Nm:'sacrifice'-Nm:'victorious step'-Af. 'strides'
 'This sacrifice, Viṣṇu, strides this victorious step for him.' (SB 1.1.2.13)



IV

etām vai etām prastāvena ṛcam āpnoti
 dDEM-Af. PTCL dDEM-Af. 'P.-Im. 'r.-Af. 'obtains'
 'This ṛc he obtains by means of the prastāva.' (cf. JUB 1.4.3.3)



PRED	āpnoti	<(↑SUBJ)(↑OBJ)>	
SUBJ	NUM	S	
	PERS	3	
	PRED	PRO	
OBJ	DET	PRED	etām
		TYPE	dDEM-cat.
	DET2	PRED	etām
		TYPE	dDEM-cat.
	GEND	F	
	NUM	S	
ADJ	CASE	A	
	PRED	ṛcam	
	NUM	S	
	CASE	I	
	PRED	prastāvena	

THE DISCOURSE FUNCTION OF THE ABSOLUTIVE IN THE PAÑCATANTRA*

Sarah Tsiang

In this paper I will provide evidence for a stylistic explanation for the frequent use of the absolute in the genre of fable literature. I will argue that the reason the absolute occurs so frequently in the Pañcatantra is that it is an extremely useful vehicle for the rhetorical organization that typifies the text. In so doing I will contribute to a better understanding of the Sanskrit absolute and will provide further evidence for the importance of stylistic investigations for historical syntactic research.

1.0 Introduction

The purpose of this paper is to relate the frequent appearance of the absolute in the Pañcatantra to its discourse function. Absolutes (also called gerunds) are a prominent feature of later Sanskrit. Gonda notes that by the post-Vedic period, the absolute is in frequency 'the main device for forming complex sentences' (1971:136). Whitney's comments about the absolute suggest that its appearance may in fact be too frequent. Comparing the occurrence of the *tvā/ya* -gerund in the Story of Nala in the Mahābhārata with its occurrence in the Bhagavad-Gītā, he remarks: 'The use of the gerund, though not changing in its character, becomes much more frequent, and even excessive in the later language' (1879:358).¹

As in other cases of historical syntax, explanations for the increased use of the absolute may come in two varieties. On the one hand, the increase may be attributed to a general historical drift which in turn may be attributed to various factors. On the other hand, it may be correlated with textual differences. Both types of phenomena can be observed for other Sanskrit constructions.

Thus, the ever increasing use of the *ta* -participle² can be explained as a 'simplification' of the past tense system, replacing in effect three distinct tense formations, the aorist, the perfect, and the imperfect. And as Hock (1986:431-2) notes, the change may have been further motivated by convergence with Middle Indo-Aryan.

A second type of argument for the increased use of a particular construction looks at the question text by text, or genre by genre, linking the use of the construction to its discourse function in different types of texts. This is the

approach in Jacobi 1903, which links nominal style to scientific writing. Gonda (1942) associates the (non-obligatory) appearance of 1st and 2nd person subject pronouns with their role as marking affective or 'colloquial' speech. Thus *kuru tvam* 'you do it' is considered more 'freundlich' (friendly) and 'aufmunternd' (cheerful) than just *kuru* 'do it' (1942:122). He concludes that the seemingly redundant 1st and 2nd person pronouns in contexts like this are 'indeed, irrespective of chronology, frequently added in a variety of affective or more or less "colloquial" utterances' (1971:123).

Now it is true that the use of the Sanskrit absolutive increased over time. Gonda notes that the absolutive 'has in the oldest texts not yet fully developed' (1971:135). The question then, is how did the language change to give a more prominent role to the absolutive? Tikkanen argues that the possible contexts for the absolutive increased as a result of changes in the language. Specifically, its functional potential increased 'due to the relaxation of its syntactic (constructional), semantic (temporal), and pragmatic (coreferential and operational) constraints' (1987: abstract). Though it is clear that the absolutive is found in 'new' contexts, Tikkanen's explanation for this expansion, namely that the Sanskrit construction converged with the Dravidian past verbal participle construction can be questioned; cf. Hock 1984 and forthcoming. Jeffers/Kantor (1984) advance a different argument for the expanded function of the absolutive, but Tikkanen (1987:71-4) considers their explanation doubtful. Moreover, discussions like these leave unanswered the question of why the absolutive construction, and not some other construction is selected for the new contexts in the first place.

In the present study, I will look at a particular genre of texts with frequent use of the absolutive to see if there is any discourse-level motivation for its heavy use, and whether that motivation is different from the one advocated by Gonda (1971) and Renou (1956a). I will do so by looking at the distribution of the absolutive in selected texts from the Sanskrit fable literature.

2.0 Accounts of the absolutive

2.1 Formal accounts

The absolutive is a non-finite adverbial form of the verb which expresses a subordinate action antecedent to (or simultaneous with) the action of the main verb as in the following examples:

- (1) *nagaram gatvā devadattaḥ kaṭam karoti*
 city-acc. go-abs. D.-nom. mat-acc. do-3 sg.
 'Having gone to the city, Devadatta makes a mat.'
- (2) *nagaram upagamyā devadattaḥ hasati*
 city-acc. appr.-abs. D.-nom. laugh-3 sg.
 'Approaching the city, Devadatta laughs.'

The absolutive has been discussed in much detail in the many excellent Sanskrit grammars, beginning with Pāṇini's *Aṣṭādhyāyī* and continuing through

more recent works such as Whitney 1879, which describes absolutive constructions mainly from a morphological point of view, and Speijer 1886 and Delbrück 1888, which describe them from a syntactic point of view. Works which specifically treat the absolutive in some detail include Hock 1987 and Tikkanen 1987. Tikkanen 1987 is a monumental work, describing in detail, with illustrative examples, every aspect of the absolutive construction, from its historical development and syntactic function to its use and interpretation in Sanskrit texts.

While formal descriptions investigate the contexts in which a particular construction can appear, and by illustrative excerpts show where that construction does appear, such descriptions cannot account for why one construction rather than another with similar grammatical function appears. In this respect, it is important to point out that there are other means of subordination available in Sanskrit grammar. For example, all of the examples in (3) use different subordinating constructions, or consecutive sentences to express the same general idea.

- (3) a. devattaḥ nagaraṁ gatvā kaṭam karoti (absolutive)
 b. devattaḥ nagaraṁ gataḥ kaṭam karoti (participle)
 c. yadā devattaḥ nagaraṁ gataḥ tadā kaṭam karoti (rel. clause)
 d. devattaḥ nagaraṁ gataḥ | sa kaṭam karoti (2 sentences)
 'When Devadatta has gone to the city, he makes a mat.'

A full-scale investigation of the use of the absolutive would compare the use of the absolutive to all other means of subordination.³ Such a study would offer insight about the 'preference' of the absolutive among competing alternatives. In light of the claim that the absolutive is probably the primary means of subordination in later Sanskrit (cf. Gonda 1971:136; Jeffers/Kantor 1984:96), this investigation will focus only on the frequency of the absolutive. And, in order to keep the investigation in manageable proportion, I will limit myself to comparing the frequency of the absolutive in two types of discourse found within the Sanskrit fable literature.

2.2 Discourse-oriented accounts

In addition to discussing the formal aspects of the absolutive, Tikkanen and other scholars also consider 'context'. But they do so only in a very narrow sense, in that context is understood as the sentence or sentences relevant to the correct interpretation of the absolutive. For example, Tikkanen looks at context in this narrow sense in order to determine whether the action of the absolutive is completed before the action of the main verb begins. This idea of clarifying context is important, since in the absence of more information, a single construction may have many possible readings as illustrated in the following example from Tikkanen (1987:7):

- (4) indram ārabhya cara
 I.-acc. grasp-abs. go-imper.
- a. 'Having taken hold of Indra, move!' /
 'Move after taking hold of Indra!'
 b. 'Take hold of Indra and move!'
 c. 'Take hold of Indra before moving!'
 d. 'Move by taking hold of Indra!'
 e. 'Go to take hold of Indra!'
 f. 'Keep yourself to Indra!'

But in spite of some general remarks about genre differences, Tikkanen is basically concerned with the sentential 'meaning' or 'function' of the absolutive. He does not examine the function of the absolutive in the discourse structure of entire texts.

Jacobi (1903) looks at examples from texts that are considered 'scientific', and claims that the 'nominal style', characterized by the sparing use of finite verbs, is appropriate for conveying abstract ideas. Renou (1956a), elaborating on Jacobi's ideas, argues that in this nominal style, the absolutive functions prominently. Now, it is true that absolutives are non-finite, and thus more 'nominal' than finite verbs. However, as this paper shows, at least in the fable literature, absolutives are eminently 'verbal' or action-oriented rather than nominal or abstract state-oriented. Moreover, though absolutives do not take verbal inflection, they show verbal syntax in so far as objects take the accusative case, and not nominal syntax (where objects could take the genitive case). The difference between verbal (5) and nominal syntax (6) is illustrated in the sentences below:

- (5) yataḥ devadattaḥ kaṭān karoti tataḥ yajñadattaḥ modate
 since D.-nom. mats-acc. do-3sg. so Y.-nom. please-3sg.
 'Since Devadatta makes mats, Yajñadatta is happy.'
- (6) a. devadattasya kaṭākāratvāt yajñadattaḥ modate
 D.-gen. mat-makerhood-abl. Y.-nom. please-3sg.
 'Because Devadatta is a mat-maker, Yajñadatta is happy.'
- b. devadattasya kāṭānām karaṇāt yajñadattaḥ modate
 D.-gen. mat-gen. making-abl. Y. please-3sg.
 'Because of Devadatta's making of mats, Yajñadatta is happy.'

Finally, as Tikkanen has observed, there are many grammatical treatises such as the Aṣṭādhyāyī which are clearly scientific and abstract, yet do not contain many absolutive constructions. Renou's nominal-style argument therefore does not contribute much to a better understanding of the absolutive.

Gonda (1971) considers the differing uses of a variety of constructions in different Sanskrit texts and types of Sanskrit texts in his discussion of 'Syntax and style' (109-60). He discusses the avoidance of the absolutive in the longer sentences of the Rīg Veda and Śatapathabrāhmaṇa, and its absence in the

ancient narrative style, but notes that 'the authors of sūtras and ritual chapters of the brāhmaṇas readily resort to it exactly to indicate the chronological succession of the ritual acts etc.' (136).

The use of absolutes in ritual texts is more systematically discussed in Renou 1956(a). Illustrations which show the use of the absolute to briefly describe and focus on the sequencing of events in a ritual may be found in the following examples:

- (7) *tád dhutvá átha anyāṁ dugdhvá púnaḥ hotavyāñ*
 so offer-abs. another milk-abs. again offer-gdv.
 'So, having offered, and then having milked another (cow), one should offer again.' (KS 35.19)
- (8) *sá vái saṁmṛjya saṁmṛjya pratápya pratápya práyacchati*
 he brush-abs. heat-abs. hand-3sg.
yáthā avamársāṁ nirṇjya ánavamársāṁ uttamám
 as touch rinse-abs. not touch last
pariṣālayed evaṁ tát tásmāt pratápya pratápya práyacchati
 rinse so heat-abs. hand-3sg.
 'Each time he has brushed and heated (a spoon), he hands it over. This is as if after having rinsed (the eating vessels) while touching them, one would rinse the last one without touching it. For this reason he hands over each (spoon) after heating it.' (ŚB 1.3.1.8)

A more general usage of the absolute, noted by Renou and Gonda, is its use as a sentence connector. Absolutes are an excellent means for this function because they can link sentences by summarizing the action described in the preceding sentence in a short phrase introducing the next sentence, see for instance example (15a) below. However, this usage is not particularly dependent on discourse type and is found throughout the classical literature.

3.0 Texts to be examined

The Pañcatantra is a fable collection organized as a series of stories told by the sage Viṣṇuśarman to the ignorant three sons of King Amaraśakti in order to instruct them in *nītiśāstra* (proper conduct). The stories in each of the five books which make up the Pañcatantra are linked together by a framestory, which introduces the sage and the King and sets up the context for story-telling. Viṣṇuśarman's stories are organized as five books, each with a different theme and framestory. The end of each story either introduces a new story, or returns to the framestory, with the result that many of the stories are nested within other stories, or within one of the levels of framestory. The fables are written in prose with verses intercalated throughout.

I have also examined some of the fables in their Hitopadeśa versions. The Hitopadeśa is a later collection based on the Pañcatantra, also written mainly in prose, which contains versions of some of the Pañcatantra fables as well as

new ones. The Hitopadeśa has a similar framelike organization, with a parallel situation of a sage telling practical stories to young princes.

4.0 A methodology for looking at single texts

A priori it may appear difficult to say anything meaningful about the usage of a particular construction by looking at one text only. However, there is a methodology which has been used in other discourse-oriented studies and which makes possible an intratextual comparison by contrasting stylistically different sections of a single text, specifically, speech passages vs. narrative passages. The idea behind this method is that if there is a difference in the use of a particular construction which corresponds to a difference in discourse type, then there must be a discourse-level explanation for its appearance or absence. That is, it must have a discourse function of some kind.

Application of the method will consist of three steps. First, I will establish by independent evidence that there are textual differences in the text. Next, I will look at the distribution of the absolute. Finally, I will look for a correlation between this distribution and the textual differences.

This method of dividing a text into subparts has been used in several studies of Sanskrit texts. Studies which divide the text or texts under consideration into their narrative and direct speech passages include Söhnen 1979 for the Rāmāyaṇa, Hock 1982(a) and Jamison (To appear) for Vedic prose, and Wallace 1984 for the Vetālapañcaviṃśati. While Söhnen was not primarily concerned with grammatical constructions, Hock, Wallace, and Jamison all present discourse-level explanations for grammatical facts. Their findings are summarized below.

Hock 1982(a) is a study of Vedic-Prose formulae. In this study, Hock argues that the verb appears in second position in phrases like *sá hovāca gārgyaḥ* 'then G. said ...' because of discourse-based fronting, not because the verb, as a kind of clitic, occupies second position according to clitic placement rules.

Jamison (To appear) finds that the referential *sá/tád* pronouns are preferred in narrative passages, while the locational demonstratives *ayám/asaú* are preferred in speech passages. To explain this distribution, she argues that while the deictic value of specifying 'this one' or 'that one' can be fully utilized in a speech situation, *sá/tád* forms have a discourse function of relating sentences and referents to each other and introducing or emphasizing key points. Her detailed discussion of the distribution of the particles *vai* and *eva* also offers a discourse-level explanation, namely that through time, these particles were reanalyzed as discourse markers.

Wallace (1984) links the choice of word order in P(atient)-oriented constructions⁴ to the conversational tone of the expressions used in a particular text, the Vetālapañcaviṃśati. The unmarked order of such constructions is Agent-Object-Verb (AOV); cf. Hock 1982(b). Wallace finds that the marked

Object-Agent-Verb (OAV) word order occurs significantly more frequently in P-oriented constructions occurring in direct speech passages than in P-oriented constructions occurring in narrative passages. He attributes this to the use of agent-backing as a politeness strategy in direct speech, as illustrated in one of his examples of OAV order:

- (9) tvam mayā adya khāditavyaḥ
 you-acc. me-inst. today eat-gerundive
 'I must eat you today.' (V)

The significance of Wallace's investigation lies in his presentation of a plausible, discourse-level explanation for the occurrence of marked OAV order.

5.0 Differences between narrative and direct speech passages in fable literature

Narrative and direct speech passages differ significantly with respect to sentence variety, sentence combination, word order, pronominal usage, and the distribution of verbal forms. These differences are briefly summarized in the following sections.

5.1 Sentence variety

Both types of passages contain short, simple sentences, though this type of sentence is much more common in direct speech passages. Direct speech sentences contain an average of slightly more than one verbal form per clause, while narrative sentences contain an average of nearly two verbal forms per clause. (A complete listing of the verbal forms is given in section 5.5).

Simple sentences with an unspecified copula, illustrated in (10) occur almost exclusively in direct speech passages:

- (10) na ayam śvā | yajñacchāgaḥ ayam
 not this dog sac.-goat this
 'This (is) not a dog. This (is) a sacrificial goat.' (H 4.10)

Questions hardly ever occur in the narrative, but are common in direct speech where they generally have a transitional function as illustrated in the following examples:

- (11) a. katham etad
 how that
 'How's that?'
 b. adhunā kiṃ mayā kartavyam
 now what by me do-gdv.
 'What should I do now?' (H 4.2)

5.2 Sentence combination

Almost every sentence in the fables begins with some sort of introduction. One type of sentence which is not generally introduced is the imperative, found, of course, only in direct speech passages. In the direct speech passages, the introductory phrase tends to get the attention of the listener, as illustrated in the following sentences:

- (12) a. Bho mitra evaṃ kariṣyāvaḥ
 O friend so do
 'O friend, so we two will do it.' (PIII 1.16)
- b. tat sāmprataṃ kṣamasva iti
 therefore now forgive
 'Therefore now forgive ...' (PI 3.6)

Occasionally, reference is made to the situation described in a preceding sentence, using a pronoun as in (13):

- (13) ... mayā etāvantaṃ kālaṃ na jñātaṃ yad tvam
 me this much time not know that you
 atra vasasi | tena pūjā na kṛtā |
 here live because honor no do
 '...all this time I did not know that you live here. Because of this I gave you no honor.' (PI 3.6)

On the other hand, most of the introductory phrases in the narrative portions either move the discourse along or summarize the previous sentence. Those phrases which move the discourse along included *atha* 'so' or *tataḥ* 'then'; or an NP followed by *ca* or *api* with the sense of 'and so'; illustrated in (14).

- (14) a. tataḥ bakaḥ cintayām āsa ...
 then heron reflect be
 'Then the heron reflected ...' (PI 1.6)
- b. sa ca sukkena sasyaṃ caritaḥ
 he and comfort grain go
 'And so he went (and fed) on the grain in comfort.' (H 3.3)

Summarizing expressions often use an absolutive construction (typically *tad śrutvā* 'having heard this' or *iti uktvā* 'having said this') or an absolute participle construction (such as *tathā anuṣṭhite* 'with this being done' or *evaṃ sati* 'it being thus'). These beginnings are illustrated in (15).

- (15) a. ... vyākulatvaṃ naḥ hṛdi vartate |
 perplexity our heart be
 tad śrutvā kambuḡrīvaḥ aha ...
 this hear K. say
 '...perplexity is in our heart. Having heard this, Kambuḡrīva said ...' (PIII 1.13)

- b. maunavratena sthātavayam ... tathā anuṣṭhite gacchatā
 silence-vow keep this do go
 kambuḡrīveṇa ...
 K.

'...a silence-vow is to be kept... This being done, by the going
 Kambuḡrīva ...' (PI 1.16)

Referential pronouns are sometimes the first element in the sentence, as in (16).

- (16) tau ūcatuḥ
 two say
 'The two said ...' (PIII 1.13)

5.3 Word order

Following Wallace, I compared the word order for P-oriented constructions in the direct speech portions and the narrative passages. I too found evidence of agent-backing in the direct speech portions. For example:

- (17) atra na asukham tvayā kāryam
 here not unfortunate you do
 'Now you should not do something unfortunate.' (PI 1.5)

My results for the 14 constructions present in the corpus are given in Table I.⁴

	Direct Speech	Narrative
OAV	5	2
AOV	2	5

Table I: Word order in P-oriented constructions

5.4 Pronominals

Naturally, 1st and 2nd person pronouns (also polite *bhavant*) occur only in the direct speech passages. Not including the defective pronominal type *ena*, two types of third person pronouns occur, relative pronouns and deictic pronouns. Among the latter, the *sa/tad* pronouns refer to characters and events in the discourse. The *eṣa/etaḍ* pronouns also refer to characters or events in the discourse, but tend to have locational connotations of the type 'this one here' or 'that one there'. The *ayam/asau* pronouns are locational only: 'this here' vs. 'that yonder'. In the direct speech portions, the referent or antecedent of the pronoun tends to be in the same clause, cf. example (10). In narrative portions, on the other hand, it tends to be in a preceding clause; cf. (15a). The distribution of each type of pronominal is given in Table II.

	Rel. pronouns ⁵ (yaḥ)	Deictic pronouns		
		discourse (sa/tad)	discourse/locational (eṣa/etaḍ)	locational (ayam/asau)
% in Dir. Sp.	62	20	80	82
% in Narr.	38	80	20	18

Table II: Distribution of pronominals

The higher incidence of *eṣa/etad* and *ayam/asau* forms in direct speech and their lower rate of occurrence in narrative passages is consistent with Jamison's findings for Vedic prose. The extremely frequent occurrence of *sa/itad* pronouns in the narrative portions (where they account for 85% of all pronouns used in narrative) likewise is consistent with Jamison's findings.

Note that relative clause/main clause (RCMC) constructions occur more often in the direct speech portions. Examples of this type of construction are given below:

- (18) a. ... *yadi tvam uttaraṁ dadāsi tadā tava maraṇaṁ*
 if you answer give then your death
 bhaviṣyati
 will be
 '... if you answer, then you will die.' (H 4.2)

- b. *adya punaḥ nagarasamīpe yaḥ hradāḥ tasmin*
 today again near the city which lake to it
 eva gacchāmaḥ
 so we go
 'But today let us go to a lake which is near the city.' (PI 1.6)

5.5 Verbal forms

The complete distribution of verbal forms is given in Table III. In the table, 'Past' includes the perfect, imperfect, and past active and *ta*-participle (when used as the main verb of the sentence); 'Present' includes the present indicative active and passive constructions; 'Absolute participle' includes the genitive and the locative absolute participle construction (cf. note 3e and example (15b) above for this type). The figures listed show the percentage of occurrence of each verbal form out of all verbal forms occurring in direct speech passages, and out of all verbal forms occurring in narrative passages.

	% In direct speech	% in narrative
NON-SUBORDINATING		
past (finite)	10	47
present (finite)	38	12
future (finite)	14	-
imperative (finite)	14	-
gerundive	6	-
SUBORDINATING		
absolute	14	35
present participle	-	3
infinitive	2	2
absolute participle	2	1

Table III: Distribution of verbal forms

Not surprisingly, the past tense dominates in narrative, the present in direct speech. Moreover, inherently non-narrative formations such as the future and the modal forms of the imperative and (non-finite) gerundive are exclusively found in direct speech. Comparing the subordinating verbal forms with the distribution of RCMC constructions (see Table II), we can again observe a clear difference between narrative and direct speech. There is a dominance of relative clauses in direct speech, while absolutes are heavily attested in narrative.

5.6 Summary of results

These results are generally consistent with the findings of Wallace and Jamison, and provide clear evidence that the narrative and direct speech portions represent two distinctly different types of discourse. There is also clear evidence that the number of occurrences of the absolute differs significantly in the two types of discourse. As can be seen from Table III, the absolute accounts for a much greater percentage of all verbs in the narrative portions (35%), than in the direct speech portions (14%).

If only this evidence were taken into consideration it might be possible to propose the following hypothesis. Absolutes occur more frequently in narratives because narratives are more complex and therefore have more subordination than direct speech. However, as noted earlier, Table II shows a much greater percentage of subordination by means of RCMC structures in direct speech. Moreover, Table III indicates that subordination by means of absolute participle structures is about equally frequent in narrative and direct speech (though both percentages are low). This evidence suggests that the notion 'subordination' is not sufficient to account for the greater frequency of absolutes in direct speech.

6.0 The discourse function of the absolute

6.1 Rhetorical structure

A more promising avenue for explaining the dominance of absolutes in narrative consists in considering rhetorical structure. Previous studies, such as Kaplan 1966, Clyne 1982, as well as Pandharipande 1982 (on Indian languages), have shown that many texts show a clearly discernable rhetorical organization. Tsiang/Watanabe 1987 characterizes the rhetorical structure of the Pañcatantra as ascending, in the sense that important information is gradually led up to, as compared to the rhetorical structure of Aesop's fables which is descending, since important events and characters are first introduced, and then elaborated on later.⁶

The Pañcatantra is organized as a series of embeddings. The outermost level is the context of Viṣṇuśarma telling the fables to the young princes. These fables are organized into five books, each having its own framestory. Within this framestory, the individual fables are told as illustrations of various

points. The 'point' is expressed as a verse, and this verse is the moral of the illustrative fable, and therefore repeated at its conclusion.

For example, Hitopadeśa 4:5 is embedded in Hitopadeśa 4:2 in the following way. In 4:2, we have the beginning of a story about two geese and a tortoise who learn that fishermen are planning to kill them. As they worry about what to do, the tortoise quotes the following verse: 'Forethought and Readywit, these two thrive well. Whatever Will Be, perishes'. Asked to explain the verse, the tortoise tells story 4:3 which is about three fish named Forethought (anāgatavidhātā), Readywit (pratyutpannamati), and Whatever Will Be (yadbhaviṣya). Naturally, Forethought and Readywit are saved, while Whatever Will Be perishes. (Story 4.4 is told by Readywit about a merchant and his clever wife, but this further complication is not discussed here.) The tortoise concludes his story by repeating the first part of the verse: 'And so I say: Forethought, and so forth.' The tortoise and geese then continue to deliberate about what they should do, and decide on a plan. The geese then warn of possible drawbacks to the plan, and quote the verse: 'A wiseman should think of a strategy and he should think of the danger. While the foolish heron watched, the herons were eaten by the mongooses.' Next 4:5 tells the story of how the herons were eaten by the mongooses (given below in example 20). And so forth.

In addition to the nesting of stories within stories, direct speech portions are nested within the narrative, each speech passage being introduced by phrases like 'He said ...' and followed by phrases like 'Having said/heard ...' This kind of nesting is illustrated in (19).

- (19) tena uktam ahaṁ tāvat jalāśayāntaraṁ gacchāmi |
 he say I at once another lake go
 iti uktvā sa hradāntaraṁ gataḥ
 this say he another lake go
 'He said: I will go at once to another lake. Having said this, he
 went to another lake.' (H 4.3)

The organization of the fables is cumulative and ascending. At the sentence level, the introduction of significant characters and actions generally comes toward the end of the sentence, and at the discourse level, the stories unfold gradually to their climax, the moral. The ascending features can be seen in Hitopadeśa 4:5, whose introduction has been described above.

- (20) (1) asti uttarāpathe gr̥dhrakūṭaḥ nāma parvataḥ (2) tatra eva revāṭīre
 nyagrodhapādape bakāḥ nivasanti (3) tasya vaṭasya adhasāt
 vivare sarpaḥ tiṣṭhati (4) sa ca bakānāṁ bālāpatyāni khādati
 (5) tataḥ sokārtānāṁ bakānāṁ pralāpaṁ śrutvā kena cid
 vṛddhabakena uktam (6) bhoḥ (7) evaṁ kuruta yūyam (8) matsyān
 āniya nakulavivarāt ārabhya sarpavivaram yāvad paṅktikrameṇa
 ekaikaśaḥ matsyaṁ dhatta (9) tataḥ tad āhāravartmanā nakulaiḥ
 āgatya sarpaḥ draṣṭavyaḥ svabhāvadveṣāt vyāpādayitavyaḥ ca
 (10) tathā anuṣṭhite sati tad vṛttam (11) atha nakulaiḥ vṛkṣopari
 pakṣisāvakanāṁ rāvaḥ śrutāḥ (12) pascāt taiḥ vṛkṣam āruhya
 sāvakāḥ sarve eva khādītāḥ (H 4.5)

(1) There is in the north country a mountain called *Ḡṛdhrakūṭa*. (2) There, in a banyan tree on the bank of the *Revā* some herons dwell. (3), (4) In a hole under the banyan tree is a snake who eats the young offspring of the herons. (5) Having heard the chatter among the sorrow-stricken herons, an old heron said: (6), (7) Hallo! So ye should act! (8) Take some fish and lay the fish out one by one in a series of steps from the mongoose hole to the serpent hole. (9) The snake will be seen by the mongooses in search of food, and will be destroyed because of the natural hatred (between snakes and mongooses). (10) This having been accomplished, that came about. (11), (12) Then the mongooses heard the cries from the young birds. Thereafter, they climbed the tree and ate all the young birds.

Notice how important subjects are introduced at or near the end of the sentences as in (1) *parvataḥ* 'mountain' (the site of the story), (2) *bakāḥ* 'herons' (the first protagonists), and (3) *sarpaḥ* 'snake' (a second, but as it turns out, minor character). The major adversaries of the herons, the murderous mongooses are not introduced until (9), where they appear in an agentive phrase. But, we are given a hint in (8) that there are mongooses by the fact that there is a mongoose-hole.

The ascending and framelike organization of the fables can be characterized as a series of terraces. At the end of each terrace is a turning-point which moves the discourse up to the next level; from one frame to another. At the story-level, the turning point is the verse which introduces the next story. Within a story, the turning-point is the main verb of the narrative sentences. A survey of the fables indicates that this verb is commonly a verb of speaking, or a verb of going, which moves the discourse to a new type of discourse, or to a new setting. This structure can be illustrated with the text of *Hitopadeśa* 4.10 given in example (21b). The translation (21a) is given first, with the turning-points marked in capitals.

(21) a.

(1) Once upon a time in the Gautama wilderness there was a certain brahmin famous for his sacrifices. (2) Having bought a goat from another village for sacrifice, having put it on his shoulder, going, he WAS SEEN BY A TRIO OF ROGUES. (3) Then these rogues thought: If by some means this goat is obtained and eaten, this will be a good plan. And, on the road under three trees, in the brahmin's path, THEY SAT DOWN AND STAYED. (4) Then by one rogue, the going brahmin WAS ADDRESSED: (5) O brahmin! (6) Why are you carrying a dog on your shoulder? (7) The brahmin SAID: (8) This is not a dog. (9) This is a sacrifice goat. (10) Immediately afterwards, by the second rogue stationed at the distance of a kos, The same question WAS ASKED. (11) Having heard this, laying the goat on the ground, reflecting repeatedly, putting the goat on his shoulder again, having a wavering mind, the brahmin STARTED OFF. (12) Then continuing on his way, by the third rogue, the brahmin WAS ADDRESSED. (13) O brahmin! (14) Why are you carrying a dog on your shoulder? (15) Hearing this, and thinking, 'Surely this is a dog,' having abandoned the goat, having bathed, he WENT TO HIS HOUSE. (16) Having carried that goat away, by the three rogues, it WAS EATEN.

(21) b.

- (1) *asti* be-3 Sg. *gautamāranye* in the forest *prastutayajñah* sacrifice-famous *kaścid* a certain *brahmaṇah* brahmin
- (2) *sa ca* & he *yajñārtham* for sacrifice *grāmāntarāt* another village *chāgam* goat *upakriya* buy-abs. *skandhe* shoulder *krtvā* do-abs.
- gacchan* go-pr. ppl. *DHŪRTATRAYEṆA* by 3 rogues *AVALOKITAḤ* see-ta-ppl. (3) *tataḥ* then *te* those
- dhūrtāḥ* rogues *yadi* if *eṣa* this *chāgaḥ* goat *kena api* some *upāyena* means *prāpya* obtain-abs.
- khādyate* eat-3 Sg. -pass. *tadā* then *matiprakaśah* wit-superiority *bhavati* be-3 Sg. *iti* 'quote' *ālocya* think-abs. *prāntare* road
- vṛkṣatrayatale* under 3 trees *brāhmaṇasya* brahmin's *varṭamani* path *UPAVIŚYA* sit-abs. *STHITĀḤ* remain-ta-ppl. (4) *tatra* there *ekena* one
- dhūrtena* by a rogue *sa* that *brāhmaṇah* brahmin *gacchan* go-pr. ppl. *ABHIHITAḤ* address-ta-ppl. (5) *bhoḥ* O *brāhmaṇa* brahmin
- (6) *kim iti* why *tvayā* by you *kukkuraḥ* dog *skandhena* on shoulder *uhyate* carry-3 Sg. (7) *brāhmaṇah* brahmin *BRŪTE* say-3 Sg.
- (8) *na* not *ayam* this *śvā* dog (9) *yajñacchāgaḥ* sacrifice-goat *ayam* this (10) *anantaram* after *punaḥ* again
- dvitīyena* by the 2nd *kośamātrāvasthitena* positioned 1 kos farther *tad* the same thing *eva* the same thing *UKTAM* say-ta-ppl. (11) *tad* this *ākāmya* listen-abs.
- brāhmaṇah* brahmin *taṁ* that *chāgam* goat *bhūmau* on ground *nidhāya* lay-abs. *muhurmuhuḥ* repeatedly
- nirīkṣya* reflect-abs. *punaḥ* again *skandhe* on shoulder *krtvā* do-abs. *dolāyamānamatiḥ* w/ wavering mind *CALITAḤ* start-ta-ppl.
- (12) *tadanantaram* thereupon *punaḥ* again *gacchan* go-pr. ppl. *sa* that *brāhmaṇah* brahmin *trītiyena* by the third *dhūrtena* rogue
- UKTAḤ* say-ta-ppl. (13) *bhoḥ* O *brāhmaṇa* brahmin (14) *kim iti* why *kukkuraṁ* dog *skandhena* on shoulder
- bhavān* thou *vahati* carry-3 Sg. (15) *tad* this *ākāmya* hear-abs. *niścitam* surely *eva* *ayam* this *kukkuraḥ* dog
- iti* 'quote' *matvā* think-abs. *chāgam* goat *tyaktvā* abandon-abs. *snātvā* bathe-abs. *SVAGRĤAM* own home *YAYAU* go-3 Sg.
- (16) *sa* that *chāgaḥ* goat *tair dhūrtaiḥ* by the rogues *nītvā* carry-abs. *BHAKṢITAḤ* eat-ta-ppl. (H 4.10)

6.2 The function of the absolutive within the rhetorical structure of the fables

In this sample story, as in the other fables, the turning points from narrative to speech, or from location to location are marked by finite verbs (or the *ta*-participle used as a finite verb). In the narrative, besides the initial *asti* which functions as the equivalent of 'Once upon a time' and begins most of the fables, the finite verbs mainly express the activities of 'speaking', and 'going' (or 'remaining'). The only exceptions seem to be *avalokitaḥ* '(was) seen' and *bhakṣitaḥ* '(was) eaten'; which focus on more specific activities or events.

But note that the rogues' seeing the brahmin in effect constitutes the starting point of the story, since it gives rise to all the later events. And the eating of the goat by the rogues represents the story's successful conclusion or endpoint. The two verbs thus mark the two most important turning points and in that sense are not true exceptions.

On the other hand, absolutives are used to express the different events of the story that lead to the turning points: 'buying', 'putting', 'laying', 'abandoning', 'bathing', 'carrying'; as well as the less 'active' activities of 'thinking', 'hearing', and 'sitting'. (The present participle is used to express 'going'.)

Thus, with the exception of the starting and concluding actions, main verbs and absolutives are in complementary distribution: The major activities described in the narrative are expressed as absolutives, while finite verbs are used to signal turning points. Absolutives can be seen as a means to pace the story in its cumulative ascent by grouping together actions on a specific level via their common subordination to the finite verb, so that the story progresses level by level.

It is this key role of the absolutive in the rhetorical structure of the fables that accounts for their great frequency, especially in sentences like (11) and (15) in (21b) where as many as four actions are 'subordinate' or lead up to the relevant turning points. Now, the relation between absolutives and finite verbs agrees very well with the often observed tendency of Classical Sanskrit to permit only one finite verb at the end of a sentence and to require the other actions to be expressed by non-finite verbs. But first, note that this is a tendency only. We do find relative-correlative structures with finite verbs in both clauses; cf. example (18a) above. Secondly, coordination with two finite (or main) verbs is a viable alternative to the absolutive construction. Thus the above story H 4.10 ends with the absolutive *nītvā* and the main verb *bhakṣitaḥ* 'eat'. Hitopadeśa 1.2 instead ends with two coordinated main verbs: *vyāpāditaḥ khāditaḥ ca* 'was killed and eaten'. And, in fact, sentences like 11 of example (21b) could be alternatively rendered by coordination as in (22):

(22)	brāhmaṇena	tad	ākaraṇitam	tena ca	chāgaḥ	bhūmau
	brahmin	this	heard	and he	goat	ground
	nihitaḥ	tad ca	sarvaṁ	nirīkṣitam	tataḥ	chāgaḥ
	lay	and this	all	reflect	then	goat
	punaḥ	skandhe	kṛtaḥ	ataḥ	brāhmaṇaḥ	
	again	shoulder	put	then	brahmin	
	dolayamānamatiḥ	calitaḥ				
	w/ wavering mind	start				

'The brahmin heard this. And he laid the goat on the ground and he reflected about all this. Then he put the goat on his shoulder again. Then, the brahmin, with a wavering mind, started off.'

It is thus not grammar, but considerations of discourse and rhetorical structure which crucially determine the use to which the absolutive is put in fable narrative.

7.0 Conclusion and Implications

This study has shown that the predominance of absolutes in one type of classical Sanskrit text, namely the narrative passages of fable literature, has very specific discourse and rhetorical foundations: The (non-finite) absolutive serves to characterize actions that lead up to (and in that sense are subordinate to) the major turning points in the narrative, turning points which are characterized by finite verbs (including the ta-participle used as a main verb).

This finding is convergent with the earlier observations of Renou and Gonda on the use of absolutes in Vedic ritual texts. However, it shows that the specific reasons for the use of absolutes may differ consistently between different texts.

Moreover, spot checks of other classical texts that can be broadly described as narrative (such as the story of Nala in the Mahābhārata) reveal that in those texts the absolutive is used more sparingly. Notice also the relative rarity of absolutes in the direct speech passages of the fables. This suggests that far from there being an across the board increase of major proportions in the use of the absolutive, the frequency of absolutes depends to a significant degree on the nature of discourse and literary genre and is appropriate for certain types of text. These findings suggest caution vis-à-vis claims like Whitney's that the absolutive is used to excess in later literature or Tikkanen's hypothesis for a general increase in use brought about by Dravidian influence.

Notes

*I would like to thank Hans Henrich Hock for his extremely useful comments and discussion of various stages of this paper. This paper also benefited from helpful comments received when an earlier version was read at the South Asian Languages Analysis Roundtable X, 1988, at the University of Washing-

ton. Any misunderstandings are my own, of course. The examples are given with their sandhi undone.

¹Cf. Gonda 1971:136, note 1 for a criticism of Whitney's claim that the character of the absolutive did not change.

²The *ta*-participle, often called the 'past passive participle' indicates general past time and can substitute for a finite verb as in the following example:

devadattena	kaṭaḥ	kṛtaḥ
D.-ins.	mat-nom.	do-ta-ppl.

'Devadatta made a mat.'

³In addition to consecutive sentences, or sequential coordinate clauses, there are nine means of indicating subordination in Sanskrit, listed and illustrated below:

- a. the absolutive (cf. examples 1 and 2)
- b. quasi-clausal participial constructions (cf. example 3b)
- c. relative clause/main clause constructions (cf. example 3c and 5)
- d. participial adnominal constructions

kṛtaḥ	kaṭaḥ
do-ta-ppl.	mat-nom.

'the finished mat'
- e. genitive/locative absolute participles (for locative absolute cf. 15b)

paśyato	yajñadattasya	devadattaḥ	kaṭam	karoti
see-gen.	Y.-gen.	D.-nom.	mat-acc.	do-3 sg.

'Even though Yajñadatta is watching, Devadatta makes a mat.'
- f. 'raising' constructions

yajñadattaḥ	devadattam	kaṭam	kurvantaḥ	paśyati
Y.-nom.	D.-acc.	mat-acc.	do-pres. part.	see-3 sg.

'Yajñadatta watches Devadatta making a mat.'
- g. quotative constructions

devadattaḥ	kaṭam	karomi	iti	vadati
D.-nom.	mat-acc.	do-1 sg.	quot.	say-3 sg.

'Devadatta said he would make a mat.'
(lit. 'Devadatta said: I will make a mat.')
- h. 'subordinating conjunctions'

devadattaḥ	ced	etad	kuryāt
D.-nom.	if	it-acc.	do-opt.

(tarhi/tadā) kaṭaḥ sundaraḥ syāt/bhavit
then mat-nom. beautiful-nom. be-opt.
'If Devadatta makes it, (then) the mat will be beautiful.'
- i. infinitive

devadattaḥ	kaṭam	kartum	icchati
D.-nom.	mat-acc.	do-inf.	want-3 sg.

'Devadatta wants to make a mat.'

⁴P-oriented constructions refer to *ta*-participle, gerundive, and passive constructions which all have promoted transitive patients and demoted agents. Their unmarked word order is AOV. These three constructions are illustrated below:

- | | | | |
|---------------------------|--------------------------------|----------|------------|
| a. <i>ta</i> -participle: | devadattena | kaṭaḥ | kṛtaḥ |
| | D-ins. | mat-nom. | do-ta-ppl. |
| | 'Devadatta made a mat.' | | |
| b. gerundive: | devadattena | kaṭaḥ | kartavyaḥ |
| | D-ins. | mat-nom. | do-gdv. |
| | 'Devadatta should make a mat.' | | |
| c. passive: | devadattena | kaṭaḥ | kriyate |
| | D-ins. | mat-nom. | do-pass. |
| | 'A mat is made by Devadatta.' | | |

⁵The sample is small because many of the attested P-oriented constructions lacked a specified agent or object.

⁶Including relative adverbs such as *yathā* 'as', *yadā* 'when', and *yadi* 'if'.

⁷In that paper, we also described the Pañcatantra as having a nominal style whereas Aesop's fables showed a more verbal style. However, our notion of 'nominal' and 'verbal' was based on an overly broad distinction, 'noun-like' or 'verb-like', where all non-finite verbs were considered noun-like.

Abbreviations of Textual References

The abbreviations of textual references are as follows:

- PI = Pañcatantra (Hertel 1908)
 PII = Pañcatantra (Hertel 1915)
 PIII = Pañcatantra (Kale 1982)
 H = Hitopadeśa (Lanman 1884)

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ON THE HEAD MOVEMENT CONSTRAINT

Xinping Zhou

The universal nature of the Head Movement Constraint (HMC) (Chomsky 1986) is here examined by looking closely at two X^0 movement phenomena in Mandarin Chinese: **qu-raising** and **l-lowering**. It is argued that, even without the prototypical properties of X^0 movement such as verb inflection, syntactic agreement, and derivational morphology commonly found in Indo-European languages, Chinese provides positive evidence for the HMC as a universal principle on syntactic representation. A number of otherwise unrelated and unexplained facts in Chinese syntax are shown to fall nicely under the general condition of the HMC. A unified theory of verb raising, negation, and aspect marking in Chinese is proposed and discussed.

1. Introduction

In the recent literature of Government and Binding theory, it has been proposed that the movement of an X^0 (word-level) category mirrors that of an X^{\max} (phrasal level) category (Baker 1988, Chomsky 1988, 1986, Pollock 1987, Koopman 1984, Travis 1984).¹ X^0 movement is a head-to-head movement of an X^0 element to another X^0 element via syntactic adjunction; X^{\max} movement, on the other hand, is a movement of a maximal projection to another maximal projection by either substitution or adjunction. It has been assumed that the movement constraint on phrasal categories, namely, the ECP, applies equally well to word level elements in the X^0 movement.

Chomsky (1986) defines the head movement constraint (hereafter HMC) by two interrelated conditions on the syntactic representation: the government condition that requires a head to be in a c-commanding relation to its residue, and a strict locality condition which requires the head movement chain [$X^0, \dots e$] not to be intervened by a barrier which is either a maximal projection or another c-commanding head, hence the minimality barrier.

(1) Head Movement Constraint (HMC) (Chomsky 1986:71)

The movement of a zero level category β is restricted to the head position of a head α that governs the maximal projection γ of β , where α θ -governs or L-marks γ if $\alpha \neq C$.

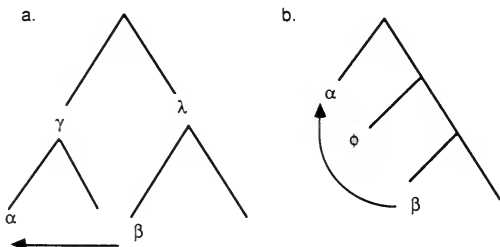
Chomsky defines θ -government and L-marking as follows.

(2) α θ -governs β iff α is a zero-level category that θ -marks β , and α and β are sisters.

α L-marks β iff α is a lexical category that θ -governs β .

According to this HMC, both structures in (3), are ill-formed.

(3)



In (3a), the head α doesn't c-command the head β . Thus movement of β into the head position of α violates the HMC. In (3b), although the head α does c-command the head β , movement of β into the head position of α at one swoop is also banned, for ϕ is a barrier by the minimality condition (4).

(4) Minimality Condition (Paraphrased from Chomsky 1986:10)

Given three heads α , ϕ , β , where

... α ...[... ϕ ...[... β ...]]

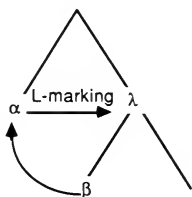
α does not govern β if there is a closer governor ϕ that governs β even though α otherwise satisfies all conditions on government.

(3b) falls afoul of ECP since the head α doesn't govern its trace because of the minimality barrier ϕ .

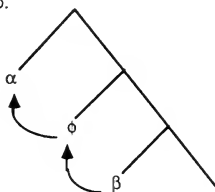
In contrast to (3), both structures in (5) are well-formed, conforming to the HMC.

(5)

a.



b.



In (5a) the head α L-marks and thus properly governs the maximal projection λ . So the movement of β to the head position of α is valid. In (5b), the head movement of β to α via the head position of ϕ is equally legitimate since the head movement in each stage is strictly local with the trace of β being either antecedent-governed or head-governed.²

It remains an open question, however, whether the HMC is a valid principle on syntactic representation universally, though it has been shown to be descriptively correct in several languages such as English (Chomsky 1988), German (Travis 1984, 1987), and French (Pollock 1987). It is extremely worthwhile to test the HMC, and ultimately ECP, for the movement of X^0 elements in a language that differs from most Indo-European languages, a language that lacks the prototypical head movement properties such as verb inflection, syntactic agreement, and subject-aux(iliary) inversion. This is therefore the major goal of this study.

In this paper, I explore the universal nature of the HMC by examining some X^0 movement phenomena in Chinese. I argue that positive evidence can be found for HMC. This argument is supported by the fact that a number of otherwise unexplained and unrelated syntactic phenomena in Chinese can be nicely accounted for if we assume HMC as a universally viable principle on syntactic representation.

In what follows I will discuss two syntactic phenomena in Mandarin Chinese in relation to the Head Movement Constraint--the verb movement of *qu*

in *qu*-VP permutation, and the I⁰ movement in relation to the well-known Neg-Aspect Marker alternation in this language.

2. *qu* Permutation

2.1. The facts

Mandarin is known to be an isolating language. One piece of evidence for such typological classification is that it completely lacks verbal inflection for tense marking. Consider (6).

- (6) a. English: I *am going* to the movie.
 b. Chinese: *wo kan dianying qu*
 I see movie go
 'I am going to see the movie.'

Here, a bare verb *qu* (to go) is contrasted to the inflected verb form of English 'be going' in denoting a future event. However, though it has no verb inflection for tense marking, Chinese arguably has verb movement. Let's again consider the same word *qu*. In structures like (6b) in Mandarin, the verb *qu* is generally permutable with a preceding VP. Thus, the sentence in (6b) has a syntactic variant (7) with the same semantic interpretation.

- (7) *wo qu kan dianying*

In (7), what we find is a pre-VP *qu*, parallel to the English word order in (6a). Both (6b) and (7) denote the same future event. This permutation pattern can be summarized in (8).

- (8) a. VP + *qu*
 b. *qu* + VP

Such permutation proves to be free in all of the following sentences noted by Lu (1988).

- (9) a. *wo [kan dianying] qu*
 I see movie go
 b. *wo qu_i [kan dianying] e_i*
 'I am going to see the movie.'
- (10) a. *ni [shui huir] qu*
 you sleep a while go
 b. *ni qu_i [shui huir] e_i*
 'You go to sleep for a while.'

- (11) a. ni [gan ma] qu?
 you do what go
 b. ni qu_i [gan ma] e_i
 you go do what
 'What are you going (there) to do ?'
- (12) a. wo [kankan] qu
 I see go
 b. wo qu_i [kankan] e_i
 'I will go and take a look (at it).'

In all these instances, the post-VP *qu* permutes with the preceding VP. However, as Lu observes, *qu* permutation is not always free.

First, when in an embedded clause, *qu* cannot move to the pre-VP position out of that clause.

- (13) a. ta bi [wo qu]
 he force me go
 b. *ta qu_i bi [wo e_i]
 'He forced me to go.'
- (14) a. women pai [ta qu]
 we send he go
 b. *women qu_i pai [ta e_i]
 'We sent him to go (there).'
- (15) a. wo qing [ta qu]
 I ask him go
 'I asked him to go.'
 b. *wo qu_i qing [ta e_i]

(13b) and (14b) are ill-formed. (15b) is a well-acceptable sentence, but it has a different semantic interpretation than (15a), meaning 'I will go to ask him.'

Secondly, when the preceding VP is an adjunct, the raising of *qu* is also prohibited.

- (16) a. wo [zoulu] qu
 I walk go
 b. *wo qu_i zoulu e_i
 'I will go there by walking.'

- (17) a. wo [chile fan] qu
 I eat meal go
 b. *wo qu_i [chile fan] e_i
 'I will go after eating the meal.'

The contrast here is rather obvious. In the ill-formed examples of (13)-(15) and (16)-(17), the verb *qu* is itself the single primary predicate, while in the well-formed free permutation examples of (9)-(12), it is not. Why should this be the case? In what follows, I will try to provide a principled account for this contrast.

2.2. Head Movement Constraint and *qu*-raising

2.2.1. The Status of *qu* and predication

Let's first consider some alternative approaches towards this *qu*/VP permutation. To begin with, a crucial generalization for the data in consideration is that *qu* raising is possible only if the preceding VP is a unitary predicate of an argument, which *qu* is also predicated to, following the predication theory of Williams (1980,1982,1987). In the well-formed sentences of (9)-(12), both *qu* and the preceding VP are linked to the same external argument, i.e. the subject of the whole clause.³ However, in the ill-formed permutation cases of (13)-(17), such unitary predication no longer holds. When *qu* is the primary predicate of an embedded clause as in (13)-(15), it is linked to the external argument of that embedding clause. Descriptively, a generalization can be formulated as (18).

- (18) A post-VP *qu* can raise to a pre-VP position if it is **linked** in predication to the external argument of that VP.

Thus, a permutable case like *wo kan dianying qu* (=8a) 'I am going to a movie' with its permutation variant of *wo qu, kan dianying t_i* (=8b) will have the following predication form.

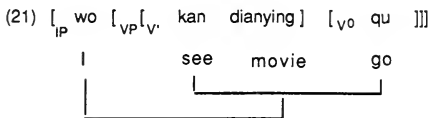
- (19) a. qu'(wo_i) ^ kan'(wo_i, dianying)
 b. *qu '(dianying)

It seems plausible then to assume that the permutable structures all have a complex VP which is made up of [V1 (XP) V2], whose argument is the subject (S), that is, the external argument of the complex VP.

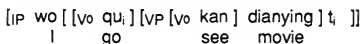
- (20) [_{IP} NP Pred P]
 (X) (Y)
 [_{VP} V1 (XP) V2]

(20) explains the predication relation of the complex VP (Y) to the external argument (X) within the same clause by the form of predicate-linking, borrowing a term from Rothstein (1983).

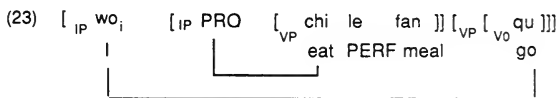
Consequently, for sentences like (9)-(12), permutation is predictably allowed, since the complex VP ([V NP qu]) is linked to one unique argument as in (21). Consequently *qu*-raising is sanctioned in (22).



(22) *qu*-raising



This predication account correctly predicts that sentences like (13)-(15) will disallow *qu* permutation since the word *qu* and the preceding VP are not linked to the same argument by predication due to the fact that they are not clausemates. For sentences (16)-(17), *qu* permutation is equally illicit, for the subject of the adjunct VP is a PRO. Therefore, the *qu* and the adjunct VP are not linked to the same argument even though the two arguments, namely the PRO in the adjunct clause and the subject of the matrix clause, happen to be co-indexed. The ill-formed derivation of (17), for example, is shown in (23)-(24)



(24) *qu*-raising: * wo [qu_i chile fan t_i]

The predication account makes correct predictions for the problems in consideration. However, it is still not clear why the *qu* movement constraint should be as such. In other words, we are still left without a principled explanation as to why the clause relation and predicate linking should have

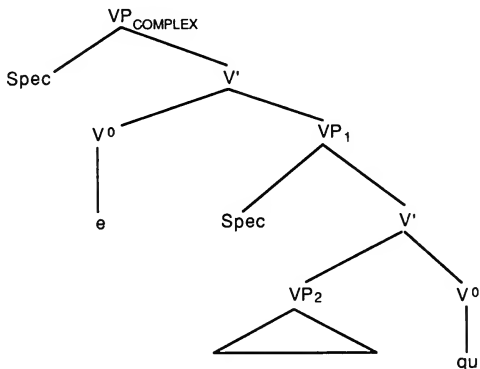
such impact on verb movement in Mandarin. We obviously need to ask what underlying principle is responsible for the surface variations of *qu* placement discussed above. Let's consider a second alternative approach.

2.2.2. The Head Movement Constraint

As I have demonstrated earlier, free permutations of *qu* all involve a structure that can be construed as having a complex VP. This syntactic structure is fundamentally different from those of the non-permutable sentences, namely, those that have the verb *qu* as the main predicate of an embedded sentence or those that have an embedded adjunct clause. In what follows I will argue that the difference in this *qu* movement is what we would exactly expect from the principle of HMC.

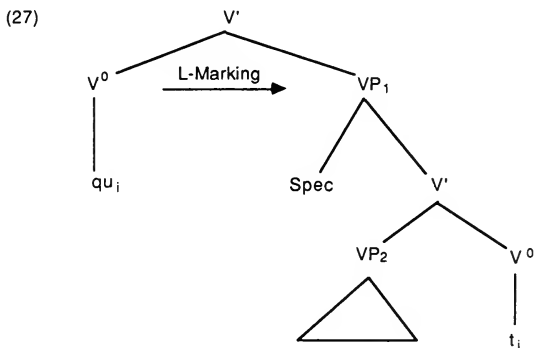
Following Larson (1988), we can construe the complex VP in question as consisting of an embedded VP.

(26)

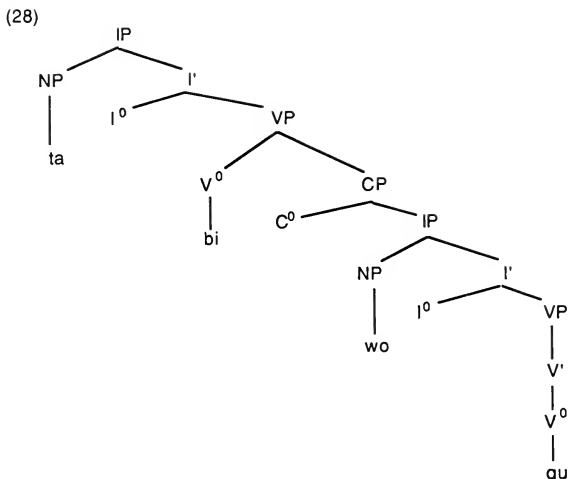


The structure of (26) is compositionally determined by the semantic relation between the verb *qu* and the preceding VP_2 , both of which form a unitary predicate for the external argument of the complex VP. We can assume that an optional Move-alpha, probably stylistic inversion, applies to (26). By verb-raising, *qu* raises to the minimally c-commanding empty head position [e].

Consequently the surface *qu* permutation follows. What we get is a free pre-VP and post-VP *qu* permutation within the VP compound. Is the HMC obeyed here? As shown in (27), the residue of the X^0 element *qu* is minimally c-commanded by its antecedent, the raised verb *qu*. After *qu*-raising, the upper V^0 in (27) becomes lexical, thus it L-marks VP_1 . Hence it governs VP_1 and every constituent included in VP_1 . Therefore, HMC is observed, since there is no barrier intervening between the upper V^0 and the lower V^0 in (27). Thus, *qu*-raising is legitimate.



We now turn to the non-permutable cases of (13)-(15) and (16)-(17). First, consider the sentences in (13)-(15). All these sentences have an embedded clause similar to the ECM structure in English. As Li (1985) argues, the parallel ECM structure in Chinese is a $V + S'$ (=CP). If this line is correct, we then would expect the structure of (13)-(15) to be that of (28).



In (28), for the V^0 *qu* to be moved to the upstairs head position of V^0 *bi*, it has to move through the intervening head positions of I^0 and C^0 as required by the Minimality Condition (4). Then, the question boils down to whether Chinese allows a $V^0 \rightarrow I^0 \rightarrow C^0$ movement. If this kind of head-to-head movement is possible, we then would expect *qu* permutation to be well-formed in (13)-(15), and ill-formed otherwise. It turns out that Chinese prohibits such movement. This point is made clear by the following contrast.

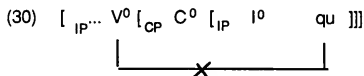
- (29) a. ta xihuan Mali
 he like Mary
 'He likes Mary.'
 b. * Xihuan ta Mary?
 'Does he like Mary?'

The fact that Chinese lacks a $V^0 \rightarrow I^0 \rightarrow C^0$ movement explains why verb inversion with the subject in interrogative sentences like (29b) is never possible.

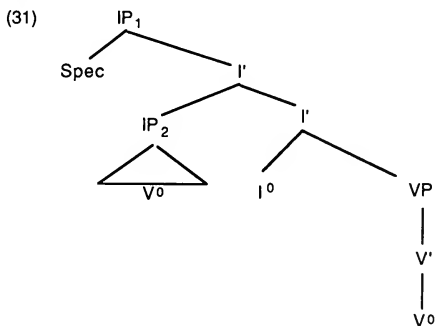
This reflects a similar test in Pollock (1987) who distinguishes tense/aspect marking patterns in English and French. In English, movement of the main verb to the COMP position is not allowed as in **Likes he Mary?* French, on the other hand, permits such verb raising as in *Aime-t-il Marie?*

Pollock argues that this verb movement constraint is attributable to the parametric setting for the node Agr P. English Agr P is opaque, i.e. suppressing the θ -role assignment property of the main verb, thus $V^0 \rightarrow I^0 \rightarrow C^0$ movement is not allowed in English. French, on the other hand, has a transparent Agr node, thus, the θ -role assignment property of the main verb is maintained even if the main verb undergoes $V^0 \rightarrow I^0 \rightarrow C^0$ movement.

Since $V^0 \rightarrow I^0 \rightarrow C^0$ is not allowed in Chinese, the verb *qu* in (28) cannot raise to the pre-VP position of the matrix IP. If it were to raise, it would violate HMC since both intervening I^0 and C^0 are minimality barriers.



Similarly, the illicit (16b) and (17b) should also fall afoul of HMC. Let's assume that in (16) and (17), the adjunct VP is adjoined to I' inside an adjunct clause IP_2 of time and manner.⁴



In (31), for *qu* to be raised into IP_2 is a violation of HMC since none of the constituents contained in IP_2 stands in a c-commanding position to the verb *qu*. Therefore, the *qu* permutation with a preceding VP in (16)-(17) is illicit.

Summarizing, we have shown that the array of *qu* raising possibilities in Mandarin Chinese falls under one general principle of HMC. Both the government condition, i.e. the c-commanding requirement (Aoun & Sportiche 1982) between an X^0 category and its movement trace, and the minimality

requirement (Travis 1984, Chomsky 1986, Rizzi 1987), i.e., the strict locality condition between that X^0 category and its movement trace, play a vital role in determining the permutation of verb *qu* with the preceding VP.

3. I-movement in Mandarin

In this part, I try to identify certain properties of I^0 movement existing in Mandarin Chinese. In particular, I will examine a possible process of syntactic affixing of aspect marking, and furthermore, I will show that this I^0 movement must obey the Head Movement Constraint, parallel to many other forms of head movement in other languages.

3.1. *le*, *zhe*, *guo* and Chinese clause structure

Chinese has three particles for aspect marking, which can be viewed as suffixes to the main verb predicate -- *V+le* (perfective), *V+zhe* (progressive), and *V+guo* (perfective). Aspect marking by *le*, *zhe*, and *guo* is shown in (32) a,b,c respectively.

- (32) a. wo du *le* zheben shu
I read PERF this book
'I have read this book.'
- b. wo du *zhe* zheben shu
I read PROG this book
'I am reading this book.'
- c. wo du *guo* zheben shu
I read PERF this book
'I have read this book.'

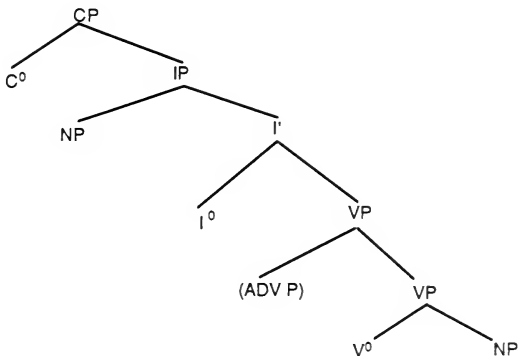
In traditional Chinese grammar, these three particles are grouped in one category called 'xuci' (form words or verb auxiliaries), and are given a unitary treatment. A legitimate question about this approach is that while both *le* and *guo* denote some action that has been completed in time, do they differ syntactically? Evidence can be found that they do. The crucial difference between the aspect markers *le* and *guo* is that **while *guo* can only be attached to a verb, *le* can be attached either to a verb or, most importantly, to a *V+guo*.** Thus, (32c) can be further stated as (33a) equally well, but (32a) cannot be further stated as (33b).

- (33) a. wo duguo*le* zheben shu
I read+guo+le this book
'I have read this book.'
- b. *wo dule*guo* zheben shu
I read+le+guo this book

The contrast here is: *le* can be an affix to be attached to a V+*guo*, but *guo*, on the other hand, can never be attached to a V+*le*. Empirically, it is perhaps plausible for us to construe *le* as a **syntactic** morpheme, and *guo* as a **lexical** morpheme. I will show in the later discussion that this assumption is correct, as it correlates with some I⁰ movement phenomenon in this language. This distinction has some vital consequences: *Le* and *guo*, being syntactic affixes, should be dominated by Infl. Moreover, *guo*, being a lexical morpheme, cannot be an I⁰ element, but is only part of the lexical item whose derivation is then restricted in the lexicon, under the old lexicalist hypothesis.

Zhou (1988a,b), following the X' schema of Chomsky (1986), proposes that the canonical clause structure for Mandarin is somewhat like (34), with a unified right-branching tree in which all complement maximal projections follow the head X⁰.⁵

(34)



Mandarin is known to have mixed word order parameters of SVO, SOV, and OSV, as shown in (35).

- (35) a. Lihua chi le fan (NP V NP)
 Lihua eat PERF meal
 'Lihua has eaten his meal.'
- b. Lihua henkuaide chi le fan (NP AdvP V NP)
 Lihua quickly eat PERF meal
 'Lihua quickly ate his meal.'

- c. fan Lihua chi le (NP_{obj} NP_{subj} V)
 meal Lihua eat PERF
 'Lihua ate his meal.'
- d. Lihua fan chi le (NP_{subj} NP_{obj} V)
 Lihua meal eat PERF
 'Lihua ate his meal.'

Zhou (1988a) argues that the surface word order variations (35c-d) are derived from the canonical SVO order in (35a-b). Both the non-gap topic structure and the topic structure with gapping in (35), i.e. SOV and OSV word orders, involve an adjunction of the nominative maximal projection to IP.

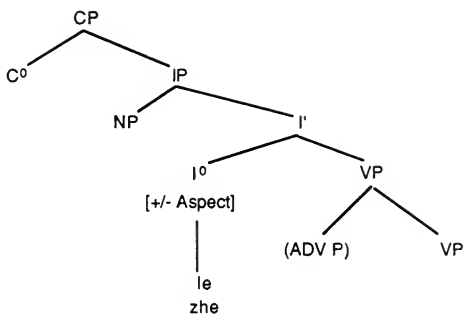
Most crucial to this study is the internal structure of IP in Mandarin. Following Pollock (1987), I propose further that the clause structure in (34) be a partitive one. As Pollock shows convincingly, clause structure in a language like English or French may be leveled into several subcomponents, each of which is an independent maximal projection -- TP, Neg P, AgrP VP, NP, etc, where T stands for tense, Neg for negation, and Agr for agreement. The syntactic derivations of verb morphology in a certain language are then accurately captured by this postulation of multi-leveled IP structure. This position was also adopted in Chomsky (1988) in his treatment of English verb inflection.

It has been accepted in generative syntax that the Infl node in various natural languages has certain Infl features, which are [+/- Tense] and [+/-Agreement] (e.g. Raposo 1987). Given these two syntactic features, we can propose that languages fall into the following four categories with regard to the specification of Infl.

- (36) a. [+tense] [+agr]
 b. [-tense] [+agr]
 c. [+tense] [-agr]
 d. [-tense] [-agr]

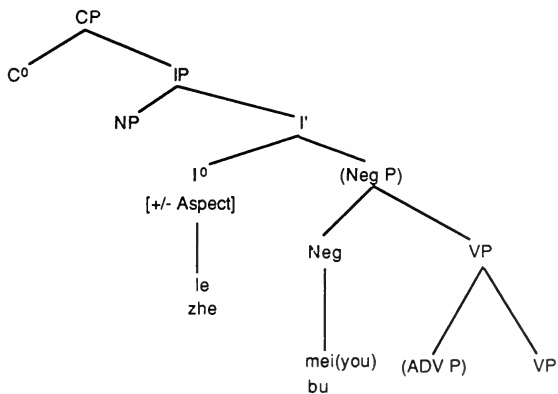
Under this feature system, Infl in Chinese finite clauses ought to be marked as [+tense] [-agr] for impoverished tense marking. By impoverished tense marking, it is meant that the language has only aspect marking for the main verb, while lacking morphological marking of tense. Therefore, a finite clause for Chinese can perhaps be (37). To make the distinction clearer, the feature [+/-Aspect] is used to replace the feature [+/-Tense] here.

(37)



Importantly, once a negation word *meiyou* is used, it should project to a maximal projection Neg P, mediating between I and VP as in (38).

(38)



With these preliminary considerations, we now turn to the Neg-Aspect marker alternation in Mandarin. I will propose an alternative solution to this problem against two previous proposals by Wang (1965) and Huang (1988).

3.2. Neg-Aspect marker alternation

Wang (1965) observes that the Mandarin aspect *le* must be in complementary distribution with the negation word *mei(you)*. To put it more simply, in Mandarin, a verb with an aspect marker *le* in the form of V+*le* cannot be negated.⁶ However, in contrast, a verb followed by the suffix *guo* in the form of V+*guo* does not respect such a constraint.

- (39) a. ta mai shu
he buy books
'He bought books.'
- b. ta **bu/meiyou** mai shu
he not buy books
'He did not buy books.'
- c. ta mai **le** shu
he buy PERF books
'He has bought books.'
- d. * ta **bu/meiyou** mai **le** shu
he not buy PERF book
'He has not bought books.'
- e. ta **bu/meiyou** mai shu
he not buy books
'He has not bought books.'
- (40) a. ta mai **guo** shu
PERF
'He has bought books.'
- b. ta **mei(you)** mai **guo** shu
'He has not bought books.'

In (39), the perfective aspect marker *le* cannot co-occur with a Neg *mei(you)* or *bu*, though the verb here clearly denotes a past action. In (40), the aspect marker *guo* is shown to be free of this constraint.⁷

Beyond Wang's observation with regard to *le* in Mandarin, we find that the progressive aspect marker *zhe* displays the same syntactic property as *le* does. It must also be in complementary distribution with a Neg.

- (41) a. wo zheng zai kan zhe shu
I just at read PROG book
'I was just reading the book.'
- b. *?wo mei/bu zheng zai kan zhe shu
not
'I was not reading the book.'
- (42) a. wo bu zai kan shu
I not at read book
'I was not reading the book.'
- b. wo mei (zai) kan shu
I not at read book
'I was not reading the book.'

In (41b), the Neg *mei* co-occurs with the progressive aspect *zhe*, making the sentence illicit. In contrast, (42) is well-formed when the aspect marker *zhe* is non-existent.

Wang (1965) proposes an affix hopping analysis for the Neg-*le* alternation, under which an auxiliary *you* affixes to a main verb only in affirmative sentences. When *you* is affixed to the main verb, it is realized as *le* perhaps by a morphological rule. In negation, this affix hopping is inapplicable. Then *you* stays in the pre-verbal position, that is, the position dominated by the Infl node if we reinterpret Wang's account in a more recent framework.

Though Wang's analysis is observationally correct, it fails to explain why the Neg-*le* alternation should be so constrained. It remains unexplained what in principle blocks the affix hopping of the syntactic suffix *you/le* to the main verb when the main verb is being negated.

More recently, Huang (1988) proposes an alternative solution to this Neg-*le* alternation. Huang argues that the fact that *le* has to be in complementary distribution with a Neg as shown in (43) follows from an independent semantic constraint.

- (43) a. *tamen bu pian-le Lisi
they not cheat+PERF Lisi
- b. *tamen pian-bu- pian-le Lisi
they cheat-not-cheat+PERF Lisi (Huang 1988:283)

According to Huang, the negative morpheme *bu* forms an immediate construction with the first V^0 element following it. Therefore the relevant structure for (43) is (44).

(44) [[v_0 bu [v_0 pian]] le]

The Neg *bu* is first locally Chomsky-adjoined to V^0 , and then the perfective *le* is further attached to this negative verb. Huang argues that such a structure must be ruled out for 'it is absurd to assign the perfective to a negated verb, just as it is contradictory to assert the completion of some event that one says does not happen' (Huang:284).

Though Huang's analysis works well for the observed Neg-*le* alternation constraint exhibited in (43), it could not explain why the negation of $V+guo$ discussed in (40b) is well-formed. Recall that *guo* and *le* here are semantically similar.⁸ Both denote a completion of action. (40b) is repeated in (45).

(45) ta [Neg mei(you) [v_0 mai guo shu]]

As is generally true, (45) has a negated verb with a perfective suffix *guo*, yet it is perfectly well-formed. According to Huang, sentences like (45) should be incorrectly ruled out on the same semantic ground as (44).

Furthermore, it has not been spelt out explicitly in Huang's analysis whether such a semantic constraint is cross-linguistically viable, for in many languages, a negated verb can certainly take an aspect marker to mean 'something not yet completed'. This being true, the semantic explanation offered by Huang for this Neg-*le* alternation may be explanatorily undesirable.

Unlike both authors, in what follows I will argue that the syntactic properties of aspect marking in Mandarin involve a syntactic affixation by I^0 -movement which is constrained by the general principle(s) governing X^0 movement in Universal Grammar.

3.3. I-lowering and the Minimality Barrier

The Neg-Aspect Marker alternation observed in the previous section, as I will argue, is exactly what we would expect from the Head Movement Constraint on the movement of X^0 categories. Before we justify this assumption, we need to consider a few related questions. First, we need to ask what exact mapping mechanism between P-makers Mandarin probably has. Second, we need to know the possible derivational patterns in syntactic affixation that exist in this language. Let's turn to the first question.

It has been widely claimed in generative syntax that inflectional derivations are realized by syntactic affixation of Infl elements, i.e. tense/aspect and

agreement features, to verbs. In such derivations, presumably two types of movement are possible: an I⁰-element first attaches to the main verb, followed by LF raising of the amalgamated verb, or alternatively, the head verb of the main predicate directly raises to the Infl node in the syntactic component to take up tense/aspect features. Let's call the first type of mapping I-lowering and the second type of mapping V-raising. Pollock (1987) and Chomsky (1988) both argue that this difference in structural mapping can be a parameter setting with regard to a specific language. For example, French very likely has a V-raising to Infl (and later to Comp) in its finite clause, while English, on the other hand, has a lowering for I⁰-elements to be affixed to the main verb, later followed by a verb-raising at LF. This proposal is supported by the following contrast between English and French from Pollock (1987:3).

- (46) a. *John likes not Marie
 b. Jean (n') aime pas Marie
- (47) a. *Likes he Marie?
 b. Aime-t-il Marie?
- (48) a. *John kisses often Marie
 b. Jean embrasse souvent Marie
 c. John often kisses Marie
- (49) a.* My friends love all Marie
 b. Mes amis aiment tous Marie
 c. My friends all love Marie
 d. *Mes amis tous aiment Marie

Assume that the clause structure for English and French is (50).

- (50) [_{IP} NP I ([_{Neg} not/pas]) [_{VP} (Adv) V...]]

Then, since verb raising to I is prohibited in English, the English I⁰ element must lower to V in the syntactic component.⁹ Thus, a pre-Neg verb in (46a) is illicit because for the verb 'like' to end up derivationally in such a position, it has to undergo raising to Infl. As for French, since it allows V→I raising in finite clause, the opposite effect should happen. This is exactly what we see here. (46b) is well-formed. Similarly, (47a) is ruled out since a V-NP inversion always requires verb raising to COMP via Infl. Again, for French, such V-raising is legitimate in (47b). The English sentences (48a) and (49a) are ill-formed because in both sentences the main verb raises to Infl across an adverb or a quantifier that is adjoined to VP, assuming the quantifier takes the scope position of an adverb here. For the French sentences (48b) and (49b), such verb raising to Infl is again well-formed and is indeed obligatory as shown by the ungrammaticality of (49d).

I want to argue that in Chinese, the aspect marking by the syntactic morphemes *le* and *zhe*, though not *guo*, pairs with their English counterparts. There is an I-lowering movement in the syntactic component by which the

syntactic affixes *le* and *zhe* attach to the main verb, followed by an amalgamated verb raising to Infi in the LF component, required by the ECP, as will be shown in the later discussion. This argument is supported by empirical data from this language. The relevant clause structure is (37) or (38). First, let's consider the following contrasts. The tests of negation, V-NP inversion, adverb placement, and qualification are given in (51)-(54) respectively.

(51) *Negation*

- a. *Zhangmin da le mei Lihua
Zhangmin beat PERF NOT Lihua
b. Zhangmin mei da Lihua
Zhangmin NOT beat Lihua
'Zhangmin didn't beat Lihua.'

(52) *Inversion*

- a. *da le Zhangmin Lihua
beat PERF Zhangmin Lihua
b. Zhangmin da le Lihua
Zhangmin beat PERF Lihua
'Zhangmin beat Lihua.'

(53) *Adverb Placement*

- a. *Zhangmin da le henhende Lihua
Zhangmin beat PERF bitterly Lihua
b. Zhangmin henhende da le Lihua
Zhangmin bitterly beat PERF Lihua
'Zhangmin beat Lihua bitterly.'

(54) *Quantification*

- a. *tamen chang zhe dou neizhi ge
they sing PROG all that song
b. tamen dou chang zhe neizhi ge
they all sing PROG that song
'They are all singing that song.'

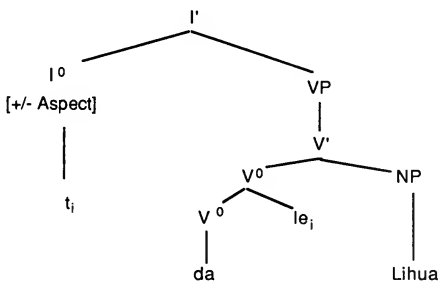
A priori, with a clause structure of (37) or (38), verb raising across the Neg in (51a) proves impossible, parallel to the situation of English illustrated in (46), with the Neg P mediating between the Infi and the predicate VP. Furthermore, since verb raising to Infi is not possible in Mandarin, the movement of $V \rightarrow \text{Infi} \rightarrow \text{Comp}$ should be equally disallowed. The ill-formed V-NP inversion in (52a) is explained accordingly. Similarly, verb raising across an adverb in (53a) and a quantifier in (54a) results in ungrammaticality. In both (53) and (54), the aspect marker *le* and *zhe* must lower to the main verb to derive the correct (53b) and (54b). Such head movement of I-lowering is shown to be legitimate in Mandarin.

Having established a theoretical basis for discussion, let's turn to the problem of Neg - Aspect Marker alternation. Recall that for the main verb to take aspect marking, the I⁰ element *le* or *zhe* has to be lowered to the main verb in the syntactic component and the amalgamated verb later raises in the LF component to cover up the traces left by the lowering of an I⁰ element in each derivational stage, thus satisfying the ECP which requires that every trace left by any syntactic movement be properly governed. Let's first consider the case when a Neg is not present in the derivation. Consider (55).

- (55) a. Zhangmin da le Lihua
 Zhangmin beat PERF Lihua
 'Zhangmin has beaten Lihua.'
 b. Zhangmin du zhe neiben shu
 Zhangmin read PROG that book
 'Zhangmin is reading that book.'

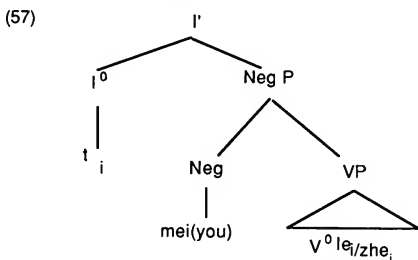
Derivations of both (55a) and (55b) are illustrated in (56) with I⁰-lowering to V in the syntactic component and V-raising in the LF component.

- (56) a. S-structure verb amalgamation

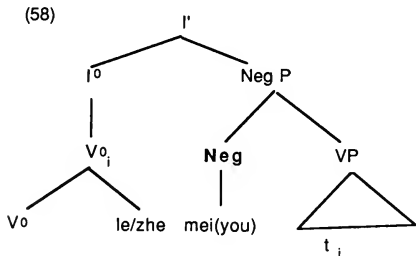


or,

mei(you) to be amalgamated with the V^0 as shown in (57), which causes no violation of any known principle since the head of NegP doesn't c-command the trace left by the I^0 element *le* or *zhe*. Also recall that this I-lowering is followed by the LF raising of the amalgamated verb.



However, it is in the second derivational stage of the LF component that an obvious violation of the Head Movement Constraint is incurred because the amalgamated verb has to move across an intervening head Neg, which does c-command the trace of the amalgamated verb.



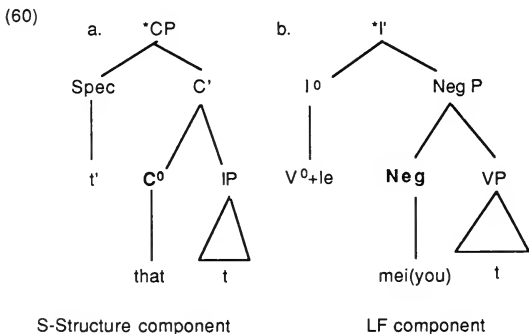
In (58) the Neg head is a minimality barrier by the definition of (4) above. Therefore the LF raising of the amalgamated verb causes an ECP violation.

- (59) a. * Zhangmin **mei(you)/bu** da le Lihua
 Zhangmin not beat PERF Lihua
 'Zhangmin has not beaten Lihua.'
- b. *?Zhangmin **mei(you) /bu** du zhe shu
 Zhangmin not read PROG book
 'Zhangmin is not reading (a) book.'

As illustrated, the derivation of I⁰-lowering of Infl element to the main verb must be prohibited when an overt Neg is present because of the HMC, and ultimately of the ECP. So, the verb can only appear in its bare form due to the lack of a verb amalgamation process discussed above. This explains exactly why Neg and aspect markers must be in complementary distribution in Mandarin Chinese.

The fact that *le* and *guo*, the two aspect markers in Chinese, behave differently with regard to the Neg-Aspect marker alternation confirms our hypothesis that there must be a basic syntactic difference between these two morphemes. That is, while *le* is a syntactic affix whose derivation is subject to HMC, *guo* is a lexical morpheme whose derivation is restricted in the lexicon, as I have claimed earlier. This *le/guo* distinction is partially supported by their distributional properties demonstrated in (33). Under the present hypothesis, the *le/guo* difference is exactly what we will expect. As the theory predicts, *guo* does not undergo I⁰-lowering in the syntactic component as *le* and *zhe* do, nor does the V+*guo* undergo LF raising, since it is not an I⁰ element under the Infl node, and the ECP requirement is irrelevant. Therefore, in contrast to *le* and *zhe*, *guo* can co-occur with a Neg. If, on the other hand, *guo* is not considered lexical, in contrast to the syntactic *le*, then there would be no way to account for the apparent difference in their behavior, except by ad hoc assumptions.

The Neg-Aspect marker alternation in Mandarin construed here as X⁰ movement mirrors the X^{max} movement constraint of the *that-trace* effect in English. Just as an intervening COMP element *that* blocks an A' movement of a phrasal category out of a CP, Neg in Chinese blocks the LF raising of an amalgamated verb. Consider the similarities in the English *that-trace* effect in (60a) and the Neg-Aspect marker alternation in (60b).



This comparison provides a strong argument against treating the Neg-Aspect marker alternation as a language-specific phenomenon, whether in a syntactic approach as in Wang (1965) or in a semantic approach as in Huang (1988). Clearly, as has been shown in this study, this phenomenon falls under the HMC and ultimately the ECP in universal grammar as we would expect.

4. Conclusion

The two head movement phenomena of *qu* permutation and Neg-Aspect Marker alternation provide additional evidence for the universality of the principle of the Head Movement Constraint, and ultimately the ECP. We have seen that a number of syntactic phenomena in Chinese are nicely accommodated in one unified account under this general condition. Theory-internally, this study argues for dual conditions of HMC: a locality requirement and a structural c-command relation between an X^0 head and its trace, and it provides further evidence for a two stage derivation for aspect marking, namely, the lowering of Infl element, in the syntactic component and verb raising in the LF component, in Mandarin Chinese.

NOTES

¹ Portions of this paper were presented at the annual conference of the Linguistics Society of America in December 1988 in New Orleans. Thanks are due to C.C.Cheng, P. Cole, T. Ernst, G. Hermon, H. H. Hock, J. McCawley, D. Wible, and J. Yoon for helpful comments and conversations on various issues related to this paper. All errors are, of course, mine.

² There have been various theories as to how the ECP is satisfied. Aoun et al. (1987) argue that head government is the necessary condition of the ECP, abandoning a more traditional approach of a disjunctive ECP. Chomsky (1988) seems to propose a similar solution. Here I am taking the more traditional view by assuming a disjunctive ECP as is done in the *Barriers* framework.

³ There are cases when the verb *qu* is seemingly permutable, yet *qu* is linked to the subject of the embedded clause, not the subject of the matrix clause.

- (i) a. wo jiao ta shangban **qu**
 I ask him work go
 b. wo **qu** jiao ta shangban
 I go ask him work

The fact is that such structures are not really free permutations since these two sentences differ semantically. Thus they should be considered as having two separate syntactic structures. The semantic interpretations for a.) and b.) in (i) are indicated by their translations in (ii).

- (ii) a. I (am going to) ask him to go to work. (I won't go)
 b. I (am going to) go to ask him to work. (I will go)

⁴ Huang (1982) assumes that such adjunct clauses in Mandarin are adjoined to VP. Since both proposals here make the same prediction for the problem under discussion, I will ignore the details concerning the potential differences between these two proposals.

⁵ In Zhou (1988a), I give evidence to show that the Chinese NP is also head-initial. The surface head-final nominative structures are derived from the D-structure head-initial configuration by an obligatory movement of the complement XP to the spec position of a DP.

⁶ The syntactic function and the semantic interpretation of the particle word *le* vary according to different contexts. It has been generally observed that *le*, besides being an aspect marker, can also be used as a sentence particle that appears in sentence-final position, expressing an exclamation or indicating a special mood on the part of the speaker. Many authors even regard these two *les* as two separate morphemes which happen to be phonologically identical. Naturally, the Neg-Aspect marker (*le*) alternation constraint will not apply to this second type of *le* as shown in (i) and (ii).

- (i) che **bu** lai **le**
 bus not come EXC.
 'The bus will not come!'
- (ii) ta **bu** mai **le**
 he not buy PART.
 'He doesn't want to buy (it) any more.'

⁷ As pointed out correctly by C.C. Cheng (personal communication), though V+*guo* compounds are free of the Neg-Aspect marker alternation constraint as shown in (40), only the Neg *meiyou*, not *bu*, can be used to negate a V+*guo* compound. Consider the following example.

ta meiyou /*bu mai guo shu
 he not buy PERF books

Thus, it seems that there is a further selectional restriction on the use of a specific negation morpheme together with a V+*guo* compound. It is therefore plausible to assume that in Mandarin, *meiyou* is used only in the negation of a

past or perfective action, while *bu* is used exclusively in negating a present or future action.

⁸ There is a slight difference between *le* and *guo*, though both denote a completion of a certain action. *le* usually carries a connotation of completing an action, while *guo* usually stresses the experience of having done something.

⁹ The only exceptional V-raisers are the semi-auxiliaries *have* and *be*, which, according to Pollock, lack the property of θ -marking their complement. So they can raise to Infl and then to Comp, like the main verb in the French finite clause.

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FINITENESS IN DRAVIDIAN*

REVIEW ARTICLE

Sanford B. Steever. *The serial verb formation in the Dravidian languages.* (MLBD Series in Linguistics, IV.) Delhi: Motilal Banarsidass, 1988. (ISBN: 81-208-0378-7; Rs. 100/--.) pp. xv, 135.

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O. Although its title may suggest something quite different, the monograph under review presents the most systematic investigation to date into the question of finiteness in Dravidian. Steever (S) presents a wealth of data from a large sampling of Dravidian languages, and his conclusions provide significant challenges not only for comparative Dravidian linguistics, but for general syntactic typology and for the issue of South Asian convergence. For reasons of space, the following discussion will concentrate on S's arguments and their empirical foundation in Dravidian. I will only briefly address the question of general linguistic typology by proposing an alternative analysis, within a larger, crosslinguistic framework. Discussion of the implications for South Asian convergence will be reserved for another occasion.

1.1. According to conventional wisdom, the structure of the Dravidian languages is of the 'strict OV' type: Sentences contain just one finite verb which is invariably placed at their right margin. Embedded structures cannot contain finite verbs, but must be construed with non-finite forms, such as verbal nouns, infinitives, relative participles, or absolutes (the latter also known as conjunctive participles, verbal participles, or gerunds). This view of Dravidian sentence structure is captured particularly well in Caldwell's remarks on the absolute:

In the Dravidian languages, though nouns and pronouns are united by means of conjunctions, finite verbs are never so united. In every sentence there is but one finite verb, which is the last word in the sentence, and the seat of government; and all the verbs which express subordinate actions or circumstances ... assume an indeterminate continuative character, as verbal participles or gerundials, without the need of conjunctions or copulatives of any kind; so that the sense ... waits in suspense for the authoritative decision of the final governing verb. (1875(1913):488)

For similar sentiments see for instance Spencer 1950 and Winfield 1928. The major concession traditionally made is that the geographically more northern

Dravidian languages permit sentences with more than one finite verb, a type of structure attributed to Indo-Aryan (or in the case of Brahui, Iranian) influence.

Let us characterize as the **Strict OV Constraint** the (claimed) generalization that Dravidian permits only one finite verb, at the right margin of the sentence, and encodes all embedded structures by non-finite means.

1.2. Now, if taken seriously, the claim that Dravidian syntax is governed by the Strict OV Constraint runs into a number of difficulties.

The most striking of these is found in quotative structures whose existence is acknowledged by all Dravidianists and which are considered a hall-mark of Dravidian syntax. In fact, similar structures in Sanskrit and many modern Indo-Aryan and Munda languages are commonly attributed to Dravidian influence. (Cf. e.g. Kuiper 1967, but see also Hock 1975, 1982, 1984.) For an example see (1). Here, in addition to the finite verb *nīṇaikkirēṇ* 'I think', which occurs at the right margin of the sentence as predicted, we have a second finite verb, *vantāṇ* 'he came', occurring at the end of the cited discourse.

- (1) *nāṇ* *avaṇ* *iṅkē* *vantāṇ* *eṇ-ru* *nīṇaikkirēṇ* (Tamil)
 'I' 'he' 'here' past 3m.s Q pres.1s
 'I think (that) he has come here.'

Now, when linguists consider structures of this type to be eminently Dravidian, they focus on the quotative marker *eṇ-ru* lit. 'saying/having said' which, being an absolutive of the verbal root *eṇ-* 'say (so)', conforms perfectly to the Strict OV Constraint. What is overlooked is the finite form which precedes *eṇ-ru* and which because of its occurrence in the same sentence as finite *nīṇaikkirēṇ* must be a violation of the Constraint.

1.3. Another difficulty lies in complex sentences of the type (2). Biclausal structures of this type, commonly referred to as relative-correlative clauses, consist of a relative clause containing an interrogative pronoun which serves as a relative pronoun, followed by a main clause introduced by a 'correlative' demonstrative pronoun. What is important is that as illustrated in (2), both of these clauses contain a finite verb, thus constituting a second violation of the Strict OV Constraint.

- (2) *evaṇ* *naṇṛāka* *uṛaikkirāṇ -ō* *avaṇ* *vāṛkkaiyil* *munṇēruvāṇ* (Tamil)
 'who' pres.3m.s Clit. 'that' fut.3m.s
 'Who works hard will progress in life.'

Relative-correlative structures have generally been considered an embarrassment (e.g. Caldwell 1875(1913):521), and there have been repeated attempts (e.g. Sastri 1934, Narasimhia 1941, Burrow & Bhattacharya 1970, Pillai 1973, Nadkarni 1975, Sridhar 1981) to attribute them to the influence of Indo-Aryan which offers similar constructions; cf. e.g. (2').

- (2') yo yatnena kāryam karoti sa samsāre pracaliṣyati (Sanskrit)
 'who' pres.3s that fut.3s
 'Who works hard, will progress in life.'

However, as Ramasamy (1981) has shown, structures of the type (2) are attested in the earliest Dravidian (Old Tamil) texts, and Lakshmi Bai (1985), apparently without being aware of Ramasamy's paper, has demonstrated that the type is attested throughout the Dravidian family. Both scholars conclude that the structures are indigenous to Dravidian, not borrowings from Indo-Aryan.

1.4. A third problem, perhaps the most striking and egregious violation of the Strict OV constraint, comes from structures of the type (3) with two finite verbs, where the Strict OV Constraint would require the first verb to be an absolutive.¹ This type was known to the ancient Tamil grammarians who referred to the first verb of such structures as *murreccam* 'a non-finite verb (expressed as) a finite verb'; cf. Natarajan 1977:182. Strangely, before S's monograph, the significance of this type does not seem to have been generally appreciated. (But note Hock 1984:98.)

- (3) (a) celvēṁ allēṁ (Old Tamil)
 fut.1p neg.1p
 'We will not go.'
 (b) iraiñciñēṁ vāṟṟiñēṁ (Old Tamil)
 past 1p past 1p
 'We worshiped (and) lived. = We lived worshiping.'

1.5. Finally, difficulties arise since due to extraposition, the finite verb does not always occur at the right margin, contrary to the predictions of the Strict OV Constraint. Some publications downplay the extent of extraposition in Dravidian; cf. e.g. Steever 1987b:741 who admits nominal extraposition only for subjects. (But see 3.1 below for extraposition of embedded structures.). Others frankly acknowledge it; cf. Beythán 1943:177 for Tamil, Subbarao 1972, 1974 (also 1984:119) for Telugu, Emeneau 1955(1961):118 for Kolami, and especially Sridhar 1989:passim for Kannada. The examples in (4) below include instances of direct object extraposition (4b) and even of multiple extraposition (last example). See sections 3.1 and 3.3 below for extraposition of embedded structures with absolutives and quotatives.

- (4) (a) akkāḷ varuvar eṅ-k kātālōr-ē (Kuruntokai 277) (Old Tamil)
 'then' fut.3m.h S
 'My lover will come at that time ...'
 (b) kaṇṭēṅ āṇṭiyai (Tamil)
 past 1s DO
 'I have seen the mendicant.'
 (c) eṭṭō ... eṭuttukoṇṭu pōka citraṇaṭatte (Old Malayalam)
 'this' 'painted' imp. DO (from Pillai 1973:164)
 'Take away this painted picture ... !'

- (d) avanu pustaka koṭṭa nanage (Colloquial Kannada)
 S DO V IO
 'He gave a book to **me**.' (emphatic)
 ?avanu nanage koṭṭa pustaka
 S IO V DO
 'He gave me the **book**.' (emphatic)
 koṭṭa avanu avanige eraḍu eṭṭu
 V S IO DO
 'She gave him two beatings!' (dramatic)

The following specific observations hold for Kannada. (Comparably complete observations for other Dravidian languages are not available to me.)

(a) Direct objects extrapose least easily. (Emeneau's statistics for Kolumbi (1955(1961):118) likewise show more examples of subject extraposition than for oblique-NP extraposition.)

(b) Extraposition does not occur freely in formal and situationally neutral contexts. It is this feature which probably is responsible for the fact that structures with extraposition do not occur easily in the fairly formal and artificial setting of field-work elicitation.

(c) Extraposition occurs more freely in various types of traditional poetry.

(d) Extraposition, even of multiple constituents, is quite common in colloquial situations.

2.1. Steever's monograph constitutes the first attempt known to me at a systematic account for structures of the type (1) - (3), not as reflecting Indo-Aryan influence, or as embarrassments, but as firmly embedded in the indigenous grammatical system of Dravidian. Such an attempt naturally requires giving up the conventional wisdom on Dravidian sentence structure. However, Steever attempts to maintain the spirit of that wisdom by replacing the Strict OV Constraint with a more sophisticated understanding of finiteness.

2.2. Chapter 1 sets the background by providing sketches of Dravidian morphology and syntax and by introducing a crucial distinction between morphological and syntactic finiteness: While morphologically, only verbs can be finite, S extends the **syntactic** definition of finiteness to nominal predicates, which in much of Dravidian exhibit agreement with their subjects, cf. e.g. (5). He consequently states his subsequent syntactic generalizations in terms of 'predicates' (both verbal and nominal), not 'verbs'. This enables him to make generalizations about finiteness without having to state each time that the rightmost 'head' of the sentence may be a noun or a verb. Moreover, defining syntactic finiteness on functional, rather than morphological grounds permits him to extend his generalizations to Malayalam whose verbs are not marked for agreement and might thus be considered morphologically non-finite.

- (5) avar ācīriyar (Tamil)
 'he' Nom.m.h Nom.m.h
 'He (is a) teacher.'

2.3. Chapter 2 deals with structures of the type (1) and (2). After reviewing the attestations and syntactic behavior of these structures in a broad selection of Dravidian languages, S argues that their embedded finite predicates are licensed by a limited set of lexical items that include the quotative verb $e\eta$ - in (1) and clitic particles like the $-\delta$ in (2). Finally, he notes that in addition to the prototypical embedding verbs $*e\eta$ - 'say, think' and $*\bar{a}$ - 'become', other (verbal and nominal) predicates of perception, cognition, communication, and comparison tend to license embedded structures with finite predicates.

According to S, verbs like $*e\eta$ - and $*\bar{a}$ - are permitted to act in this manner because

In Lakoff's (1970) terms, they are negative absolute exceptions to case-marking. Since the theory of case-marking is responsible for the morphological interpretation of direct objects, and not the theory of finiteness, the verbs $*\bar{a}$ - 'become' and $*e\eta$ - 'say, think' shield their direct objects from the application and effects of Rule (1) [the rule assigning finiteness]. And since these two verbs are negative absolute exceptions to case-marking, they need not subcategorize objects that are subject to case-marking, viz. nouns, but may take expressions of any category and form. This flexibility in subcategorization permits these two verbs to combine with an object that contains a formally [i.e. syntactically] finite predicate. (20)

Nominal and verbal predicates which have the same properties as $e\eta$ - are classed with it as 'Finite Predicate Embedding Predicates' (FPEPs), and similarly-acting clitics are labeled 'Finite Predicate Embedding Clitics' (FPECs).

S then proposes a rule (p. 36) which permits predicates to be finite (i) in the 'root' (or matrix) clause, and (ii) in embedded structures *c*-commanded by FPEPs and FPECs (such as $e\eta$ - and $-\delta$). Elsewhere predicates are non-finite. Since these structures occur in all Dravidian languages and in the earliest Dravidian texts, S argues that they must be reconstructed for Proto-Dravidian.

2.4. The remainder of the monograph, viz. Chapters 3 - 7, takes up structures of the type (3), which S calls '**Serial Verb**' (SV) formations and defines as structures 'in which two or more finite verbs occur together, marking agreement among themselves' (1). To understand S's monograph, it is important to understand — and accept — this definition which as S acknowledges, differs from other uses of the term 'serial verb'.

Chapter 3 sets the stage for the discussion of SVs and examines in detail the evidence of the South Dravidian languages Tamil, Kota and Toda, Kannaḍa, and Kodagu. Chapter 4 looks at the the South-Central languages Telugu, Muria Gondi, Pēngo, and Kuvi. Chapter 5 investigates the Central languages Parji, Kolami, and Ollari. Chapter 6 considers the North Dravidian languages, Kurukh, Malto, and Brahui. And Chapter 7 presents a summary, conclusions, and 'prospects for the future'.

According to S, the prototypical SV construction is the 'compound type' in (3a) repeated below as (6a). In one subtype, illustrated in (6a), the final verb functions as an auxiliary. Other types are the following: (i) The 'coordinate' type in (3b) repeated as (6b), which encodes two coordinate or sequential actions; (ii) the 'balance' type in (6c), similar to (6b), but signalling an action common to the two conjoined actions; (iii) the 'iterative' type in (6d) in which repetition of the verb signals repeated or continuous action; and (iv) the 'echo' formation in (6e). The latter construction, open also to non-predicates, is morphologically similar to the iterative one, except that the second occurrence of the verb has its first syllable replaced by *ki-* in Tamil, *gi-* in Kannada, etc. In Tamil, this structure tends to have negative connotations, similar to the Yiddish-English type *syntax-shmyntax*. In other languages, it can be glossed by something like 'He is hungry etc.' = 'He is hungry and thirsty (...)'.
 (6) (a) celvēṃ allēṃ (Old Tamil)
 fut.1p neg.1p
 'We will not go.'
 (b) iraiñciṇēṃ vārttiṇēṃ (Old Tamil)
 past 1p past. 1p
 'We worshiped (and) lived.' = 'We lived worshipping.'
 (c) ... vizu aya kulur poṭi tinad uṇad (Konda)
 'all' 'that crane bird' past 3n.s past 3n.s
 'eat' 'drink'
 '... that crane consumes everything.'
 (d) nān even even ayya (Medieval Kannada)
 I fut.1s fut.1s
 'O lord, I will keep entreating (you).'
 (e) avāṇukku-p pacikkirātu ki-cikkirātu (Tamil)
 'to him' pres.3n.s pres.3n.s
 'He is always hungry, or some damn thing!' (S's gloss)

After careful examination of the comparative and historical evidence, S argues that the SV construction and all of its subtypes must be postulated for Proto-Dravidian. Though there may be difficulties in details, S's demonstration is highly convincing. The two most persuasive arguments are the following:

(i) The type (6a/b), is found in Old Tamil but has disappeared in Modern Tamil and the closely related Malayalam. This historical development is more compatible with a hypothesis that regards the SV formation as ancient and inherited than one which considers it an innovation.

(ii) If the 'auxiliary' subtype is reconstructed for Proto-Dravidian, then we can account for the phono-morphological peculiarities of a number of verbal structures in Kota and Toda (p. 52-3), Konda (72-77), Pengo (77-83), and even in Classical and Srilankan Tamil (84-6). (For a fuller discussion, see Steever 1987a.) Without such a reconstruction, the history of these structures, and (in Pengo) even their synchronic behavior, remains obscure.

While the SV formation shares with the structures in (1) and (2) the fact that in S's view it must be reconstructed for Proto-Dravidian, its grammatical account is different: S argues that in SV structures only the rightmost verb, the 'head', is syntactically finite, while the remainder receives finite marking by morphological agreement with the head (112).

3. The significance of S's work for typological studies in general and for studies of South Asian convergence in particular cannot be underestimated; for it presents a picture of early and Proto-Dravidian finiteness that is markedly different from the traditional Strict OV Constraint.

This is not to say that no difficulties remain. In the following I will discuss a few of these. I will also argue that an alternative account is worth considering, an account which attempts to place the question of finiteness into a larger cross-linguistic context.

3.1. Let me start with a relatively minor problem: S offers no explicit account of nominal constituent extraposition of the type (4) above. True, he acknowledges the existence of absolutive extraposition of the type (7) below. And in the discussion of that phenomenon he raises the possibility of omitting all references to linear order and to 'rely solely on command relations to identify the unique finite predicate in the sentence' (17). However, given the traditional view of Dravidian syntax, an explicit discussion of constituent extraposition would have been desirable. Moreover, it would have been helpful if S had provided an explicit formulation of a non-linear account of Dravidian finiteness.

- (7) civa pūjai kūṭa ceykirār, tīṭcai eṭuttu koṇṭu (Tamil)
 pres.3m.s abs. abs.

'He even performs a Siva pūja, having taken (a vow).'

3.2. A related problem lies in the fact that S's account of the SV formation appears to make the implicit assumption that the members of the structure must be adjacent. But as he acknowledges in Chapter 3, note 3 (p.125), Old Kannada offers two examples of the echo-subtype, but with non-adjacent finite verbs; cf. e.g. (8). Interestingly, it is not the verb that has undergone (*gi*-)echo-formation, but its complement.² Even so, the verb is repeated — in morphologically finite form — along with the echoed complement.

- (8) bomman embavana kāṇe gi-mman embavana kāṇe
 'Bomma' eṅ- VN. neg.1s 'Gi-mma' eṅ- VN neg.1s
 'I do not see = I acknowledge anyone named Bomma, named Shmomma'.

If no other constructions of this type were attested in Dravidian, these examples might be dismissed as isolated aberrations. However, note the similar passages in (9), cited by S on pages 70, 78, and 86, but without further discussion of the question of non-adjacency. These suggest that the pattern is

more widespread. Still, structures of this type could be taken care of by formulating the rules for SV constructions without appeal to adjacency.

- (9) (a) mēṛa ātaḍ mide ātaḍ (Konda)
 'storeyed past 3n.s 'terraced past 3n.s
 building' building'
 'A mansion became (his).'
- (b) iver nar ubjatarna jarman ātarna (Pengo)
 'these men' pres.perf. 'birth' pres.perf.
 3m.p 3m.p 'become'
 'These men have been born.'
- (c) pāv patti cendar oṛ patti cendar (Parji)
 'path' 'taking' past 3m.p 'path' 'taking' past 3m.p
 'They went by the path.'

The difficulties, however, seem to extend farther and to bear on more central aspects of Dravidian syntax, including quotatives and coordination.

3.3. Let us first examine the question of quotative structures. Here, the commonly held view, based on the evidence of the South Dravidian languages, is that quotative marking is obligatory for embedded (direct) discourse and that this marking is accomplished by the verb *eṇ- 'say so', either in its finite form or in various non-finite formations. Of the non-finite forms, the absolutive is perhaps the most important, since it is said to be required if the discourse is introduced by verbs of speaking other than *eṇ-; cf. (10a). On the other hand, the occurrence of a finite form of *eṇ- precludes the use of the absolutive in the same structure; cf. (10c/d). Finally, like other constructions with absolutives, embedded discourse marked by the absolutive of eṇ- may be extraposed; cf. (10d). Beythan (1943:204), discussing Tamil, labels such extraposition as rare. However, Sridhar (1989, §1.1.1.1) considers it perfectly natural, as long as the absolutive form of eṇ- follows the extraposed discourse.

- (10) (a) nāṇ avaṇ iṅkē vantaṇ eṇ-ru niṇaikkiṛēṇ (Tamil)
 past 3m.s Q pres.1s
 'I think that he has come here.'
- (b) nāṇ avaṇ iṅkē vantaṇ eṅkiṛēṇ (Tamil)
 past 3m.s pres.1s
 'I say that he has come here.'
- (c) *nāṇ avaṇ iṅkē vantaṇ eṇ-ru eṅkiṛēṇ (Tamil)
 past 3m.s Q pres.1s
 'I say that he has come here.'
- (d) nāṇ appoṛutē conṇēṇ-ē āpatt'āka muṭiyum eṇ-ru (Tamil)
 past 1s Q
 'I said it then: "It will end dangerously."'

As noted in Hock 1982:75, in a number of geographically more northern languages of the South-Central and Central Dravidian subgroups, we find a rather different situation. Cf. the texts from Kolami in Emeneau 1955(1961),

lead one to expect one of two alternatives: (i) Two or more propositions are juxtaposed as independent sentences, each with a finite predicate, and without any marking of coordination ('asyndesis'); or (ii) Two or more propositions are embedded in a single sentence, such that all but the last are marked by a non-finite predicate, usually the absolutive.

Before entering the discussion, let us briefly review some background information. While the Dravidian languages permit conjunction of nominal constituents by means of the enclitic particle **-um* (commonly attached to each of the coordinated elements, as in (13)), such conjunction is not possible for finite verbs; cf. (14a). Instead, one of the two verbs has to be converted into a non-finite form (cf. the absolutive in (14b)), or the two constructions are juxtaposed asyndetically, as in (14c) and (14d). Under either of these alternatives, no connecting clitic **-um* is said to occur. (Examples (14a/b) are from Beythan 1943: 155, (14d) is from S's monograph, p. 84.)

- (13) *avaṅ-um ava|um* (Tamil)
 'he and she'
tōttattil-um kollaiyil-um vīṭṭil-um ...
 'in garden, yard, house, and ...'
- (14) (a) **eṅṅai-p pārṭṭāṅ-um kūpiṭṭāṅ-um* (Tamil)
 'me' past 3m.s-& past 3m.s-&
 'He saw and called me.'
- (b) *eṅṅai-p pārṭtu-k kūpiṭṭāṅ* (Tamil)
 'me' abs. past 3m.s
 'He saw and called me.' or 'Having seen (me), he called me.'
- (c) *eṅṅai-p pārṭṭāṅ eṅṅai-p kūpiṭṭāṅ* (Tamil)
 'me' past 3m.s past 3m.s
 'He saw me. He called me.'
- (d) *kunṅ-um malai-um pala piṅ oriya vantaṅeṅ* (Old Tamil)
 'come'pres.perf.1s
paricil koṅṭaṅeṅ celarṅku
 'bring'pres.perf.1s
 'I have come across many hills and mountains; I have brought gifts to distribute.'

As S notes (34-35 and 87), in the geographically more northern languages, structures containing finite predicates can be conjoined, often by means of overt conjunctions; cf. e.g. the examples in (15). And these conjunctions in many cases are borrowed from Indo-Aryan (such as the *aur* in (15d)). (Here and below, the Kurukh examples come from Hahn 1911, and the Pengo and Kuvī examples from S, Burrow & Bhattacharya 1970, or Israel 1979.)

- (15) (a) *buga buga icat ūmat rayla mato kuckatat* (Pengo)
 past 3n.s past 3n.s past 3n.s
 'It made (the sound) "bugabuga", flew about, (and) settled on a Rayla tree.'

Now, (15c) above appears to be an example of just such a construction, except that the two verbs are not adjacent. There is, however, one problem: In Hahn's (fairly limited) texts, all instances of non-adjacent structures of this type seem to contain the particle *darā*; and on p. 83, Hahn lists that particle as a conjunction, meaning 'and'. The question, then, must be: What is the historical — and synchronic — standing of *darā*? Is it a conjunction? Can it be considered a clitic of the type **-ō*? Or was it — and the alternative marker *kī* — originally a tense-aspect particle comparable to the postverbal *ke* that commonly appears in Kuvī narratives?

Secondly, conjunctions or conjunction-like elements that occur between conjoined propositions with finite verbs are found also in members of the Southern subgroup. In Kannada we find particles like *matu* (Sridhar 1989: §1.3.1.1, Madtha 1981) which look native Dravidian, as well as *athavā* (Madtha 1981) which comes from Sanskrit; Tulu offers *šivāyi* (Dravidian?) and *athava* (Sanskrit); cf. Bhat 1967:113; etc. Now, it is possible to consider all of these to have originated under Indo-Aryan, specifically perhaps Sanskrit, influence. But note that Indo-Aryan particles interposed between conjoined sentences, such as Skt. *athavā* 'or', Hindi *aur* 'and', are themselves innovations, going back to earlier adverbials of the type '(and) then'. Could some of the indigenous-looking interposed sentence linkers of Dravidian have similar sources?

The prototypical conjunctions of early Sanskrit were *ca* 'and', *vā* 'or' which, like Dravidian **-um* 'and, also, even', were enclitics that followed the coordinated elements, rather than being interposed between them; cf. (17a).

- (17) (a) sa ca sā ca
'he and she'
udyāne (ca) prāṅgaṇe (ca) gṛhe ca (...)
'in garden, yard, and house ...'
- (b) mām apaśyac (ca) ahvayac ca
'me' past sg.3 & past sg.3 &
'He saw and (he) called me.'
- (c) mām (ca) apaśyat mām ca ahvayat
'me' & past sg.3 'me' & past sg.3
'He saw me and (he) called me.'

Now, Sanskrit enclitic *ca* and *vā* can be used to coordinate not only constituents, but also sentences, as in (17c), whereas common wisdom has it that Dravidian **-um* can only coordinate constituents; cf. above. However, this assessment of the behavior of Drav. **-um* does not appear justified. True, (14a) shows that unlike Skt. *ca* in (17b), Drav. **-um* cannot attach to finite verbs. However, it does not thereby establish that Dravidian has no counterpart to the Sanskrit construction (17c), in which the conjunction is enclitic on the non-verbal first constituents of conjoined sentences.

In fact, there is a fair amount of evidence that Dravidian **-um* does occur in structures comparable to (17c), even (or perhaps especially) in the generally

more conservative South Dravidian languages. Cf. e.g. the examples in (18). This use of *-um* seems to be especially at home in structures of the type (18a-c) which contain negatives. But as (18d-f) show, it may be found elsewhere. And (18g) suggests that similar structures, but without overt conjuncting particles, occur in other South Dravidian. (Example (a) is from Boba 1904:150; (c) from that 1907:113; (d) from Beyhan 1943:29; (f) from Emeneau 1984:67-8; (g) from Mahapatra 1979:229; (b) and (e) have been provided by N. Rau-Murthy.)

- (18) (a) *itu mey alla au-v-um mey alla* (Tamil)
 this neg. that & neg.
 'This is not true, and that is not true.'
 = 'Neither this nor that is true.'
- (b) *idu baṣke alla kurci(n-u) alla* (Kannada)
 this bed neg. chair (& neg.)
 'This is not a bed, nor is it a chair.'
 = 'This is neither a bed nor a chair.'
- (c) *aḥāra dante sarronṭu māmsā -la iddi nettri -la iddi* (Tulu)
 'flesh & neg. blood & neg.
 'Because of a lack of food, neither (is) flesh in the body, nor (is) blood.' = '... there is neither flesh nor blood in the body.'
- (d) *maṇitar ariṇṭarkaḷ kuraikaḷ(-um) ariṇṭana* (Tamil)
 past 3m.p (& past 3m.p)
 'Men perished and horses perished.'
 = 'Men and horses perished.'
- (e) *manuṣya(ru) sattuṇu naviḡalu(-v-ū) sattuṇu* (Kannada)
 past 3m.p (& past 3m.p)
 'Men died and dogs died.'
- (f) *twi-m iṣṣini. ēr-m baṭṣini. kēr-m bī. ḡoḡṣini* (Toda)
 DO-& 1s DO-& 1s DO-& 1s
 'I have made the two-day funeral, and have caught the male buffalo, and have helped you perform the funeral.'
- (g) ... *baṛnaḡḡar anda ikeḥ iḡmanah* (Malto)
 pres.2p 'then' who' m. fut.3m.s
 ikeḥ iḡmanah
 who' m. neg.fut.3m.s
 '... you snatch from each other, (and) then some may get (something) (and) others may not get (something).'

Structures of the type (18) are interesting on several counts:

(i) Their multiple finite verbs cannot be accounted for as licenced by embedding predicates or clitics — unless we want to extend the definition of such clitics to the connector *-um*. But note that unlike S's finite-predicate embedding clitics, this particle does not occur after the embedded predication, but within a coordinate structure, after the first constituent. If we include particles like *-um* in the set of embedders, then there is no reason to exclude connectors of the type Kannada *matṭu*, which occur interposed between the conjoined

structures. And in that case one must ask whether the notion of embedding predicates and clitics cannot be replaced by something like coordination.

(ii) Semantically/pragmatically, multiple finite predicate structures connected by means of **-um* can be considered to share the notion of coordination with (most of) the SV formations (including the special subtypes in (8) and (9)), as well as with constructions of the type (15a) which describe a sequence of conjoined actions. (Coordination is quite obviously involved in the 'coordinate' and 'balance' subtypes of the SV formations. The 'iterative' subtype involves a sequence of coordinated actions. And as the 'etc.' of glosses of the 'echo' subtype suggest, this type involves coordination of the base-verb action with similar (unspecified) actions. Only the auxiliary subtype is not clearly coordinative, unless it is argued that the base verb and the auxiliary jointly contribute to the meaning or function of the structure.) If this interpretation is correct, then SV formations may have originated as structures with conjoined finite verbs comparable to the Sanskrit type (17b), except that the Dravidian constraint against combining *-um* with finite verbs would have required these structures to surface without an overt marker of coordination.

(iii) Syntactically, structures of the type (18) differ from SV formations, as well as from the type (15a): While the latter require the multiple finite predicates to have identical subjects, the type (18) permits non-identical subjects. In fact, here identical subjects appear to be in the minority.

Accounting for structures of the type (18), therefore, may require more than just a minor adjustment of S's rules for syntactic or morphological finiteness.

3.5. A further set of problems concerns relative-correlative structures of the type (2) above. S here accepts Lakshmi Bai's (1985) argument that the clitic **-ō* is an ancient and necessary element of these structures³ and thus apparently feels justified in postulating for Proto-Dravidian a clitic embedder that licenses the finite predicates of relative clauses.

However, Lakshmi Bai's Old Tamil data do not support such an assumption. The only two Old Tamil examples of relative-correlative structures that she cites are of the type (19) below, with a 'conditional', i.e. morphologically non-finite verbal form in the relative clause. (The example comes from Tolkāppiam; its transcription follows Ramasamy.)

- (19) epporu! āyiṇum allatu ill eṇiṇ apporu! allā-p pirīṭuporu! kūra!l
 'which thing' cond. 'that thing'
 'When the phrase *allatu ill-* is used to denote the scarcity of anything, it is to be used along with the other things available of the same category.'
 or: 'The scarcity of which thing *allu ill-* is used to denote, ...'

From Lakshmi Bai's perspective of trying to establish that relative-correlative structures are old and indigenous in Dravidian, there is nothing wrong with citing such examples from the oldest Dravidian texts. However, the examples

be generalizing, considers the presence of the clitic motivated by that function; for *- \bar{o} also elsewhere is used as generalizer (as in the Tamil combination *et- \bar{o}* 'something' from *etu* 'what' + *- \bar{o}). However, Ramasamy provides ample evidence that Modern Tamil relative-correlatives with *- \bar{o} are not limited to generalizing function and that, moreover, one of their functions is to serve as 'ordinary', non-generalizing relative clauses in syntactic contexts where prenominal structures with relative participles cannot occur. Sridhar (1989) provides similar rich evidence for Kannada. Here again, more comparative and historical research is needed.

The history of relative-correlative clauses with finite predicates, thus, is still far from settled. However, if as suggested above, the addition of *- \bar{o} to such clauses is a (possibly regional) innovation, then S's account for syntactic finiteness will require further reconsideration.

4. Given the difficulties observed so far, it may not be inappropriate to confront S's account of Dravidian finiteness with a possible alternative.

In Hock 1984:102 I noted a crosslinguistic tendency for quotatives and absolutes (or other non-finite verbal subordinating devices) to be correlated with SOV order:

(W)hile the presence of one of these syntactic features does not necessarily entail the others (cf. absolutes in SVO English and quotatives in SVO Ewe, for which cf. Lord 1976), the correlation is a common tendency in SOV languages. Thus many of the Australian SOV languages have absolutes and similar non-finite subordinating devices (cf. Yallop 1982:134-40). The situation is similar for Quechua (cf. e.g. Cerrón-Palomino 1976:251-73, Coombs et al. 1976:171-2, Stark et al. 1973:24) and other Amerindian languages (cf. Davis 1973:139, 180, etc. for Luiseño). Moreover, at least some varieties of Quechua (cf. Coombs et al. 1976:176-9, Stark et al. 1973:247), as well as North American Luiseño (Davis 1973:257-8) additionally have quotative constructions.

And as noted elsewhere in my 1984 paper, similar correlations of SOV with absolutes and other non-finite formations, as well as with quotatives, are found in the ancient Near Eastern languages Sumerian, Accadian, and Elamite, as well as in the Altaic languages (e.g. Turkish). I went on to suspect that

(T)his correlation is connected with a tendency in SOV ... languages to make the generalization that sentences, rather than clauses, have just one finite verb, at the end ... of the sentence. Non-finite absolute-like structures would help to implement this generalization, by eliminating possible violations in ... subordinate clauses ... Quotative markers seem to solve the problem for the finite verbs of QUOTES, by indicating that, in a sense, these quotations — and their finite verbs — are outside the scope of the (matrix) sentence.'

My speculation concerning quotatives finds further support in Steever's (1987c) language-specific explanation of the motivation for the use of quotative structures in Dravidian:

The syntactic restrictions imposed by Rule A [the rule permitting only one finite predicate per sentence] lead to a particularly thorny pragmatic constraint. The grammar of complex sentences, as expressed in this rule, provides no means of forming direct discourse ... This consequence of Rule A goes against the general belief that direct discourse is both less marked and more common than indirect discourse.

In addition, SOV languages exhibit a variety of strategies for relative clause formation. These include of course non-finite, participle-like structures such as the ones found in Dravidian and commonly postulated as their only relative-clause strategy. Another non-finite strategy is nominalization, as found for instance in Yuman (Langdon 1977). Beside (or instead of) these non-finite devices, however, a number of SOV languages offer relative-correlative structures; cf. Downing 1978. And as Ramasamy and Lakshmi Bai have shown, these languages include the Dravidian language family. On the other hand, relative-correlative structures do not seem to be common in SVO languages. Like quotatives, absolutives (etc.) they seem to be significantly correlated with SOV.

This correlation can be accounted for if we note the following: In surface structure, relative-correlative constructions differ from non-finite relative strategies, as well as from the postnominal clausal type of languages like English, by the fact that the relative clause is not embedded into the correlative 'main' clause. On the surface, therefore, they seem to involve coordination, not embedding or subordination. And that coordination is overtly marked by a pair of correlated markers, the relative and correlative pronouns, just as the coordination of constituents (or clauses) tends to be marked by a pair of correlated markers in Dravidian (**-um ... *-um*) and early Sanskrit (*ca ... ca*); cf. 3.4 above.

Assume now that this surface parallelism between relative-correlatives and coordinate structures is syntactically significant (at the level where finiteness is assigned) and that moreover, the Dravidian pattern of apparent sentential coordination with finite predicates in the conjoined sentences (and the similar pattern in Sanskrit) is not in some ways aberrant, but is a crosslinguistic possibility in SOV languages.

In that case it can be argued that the constraint that sentences can contain only one finite verb is a property of structures involving subordination, but does not (necessarily) affect structures with coordination. Put differently, for the purposes of finiteness, structures with clausal/sentential coordination are (or may be) treated as containing conjoined **sentences**, not (embedded) clauses. Being construed as coordinated sentences, relative-correlative structures therefore can each contain a finite verb.

In addition to accounting for the early Dravidian relative structures with finite predicates not licensed by clitic particles, the alternative interpretation just proposed explains the widespread appearance of coordinate structures with multiple finite verbs (cf. 3.4 above). Like relative-correlatives, they involve sentential coordination and therefore are not subject to the 'one-finite-verb' constraint.

On the other hand, certain elements of Dravidian structure are more difficult to explain under this alternative approach. One of these is the apparent introduction of clitic **-ō* after the finite verbs of relative clauses and the extension of the resulting pattern in a large number of Dravidian languages, at the expense of structures without clitics. Another is the widespread tendency noted by S to expand the set of quotative embedders to verbs other than **eŋ-*, the prototypical quotative marker of early and common Dravidian. Both of these developments are admirably accounted for by S's rules. But there is nothing in the alternative account that would motivate the appearance of final clitics in relative structures; and the modern Dravidian quotative situation is markedly different from the one in most other languages with quotatives, where the number of quotative markers is highly restricted.

It thus appears as if the two hypotheses are complementary; what is explained by one is difficult for the other. Perhaps this complementarity reflects a historical change in Dravidian, from an earlier system in which the rules of finiteness did not apply to coordinated structures, to a later and perhaps regional system, in which they did and in which they consequently had to be governed by a new set of finiteness rules, presumably the ones proposed by S.

Such a scenario may account not only for the observed differences in relative-clause formation and for the fact that coordinated structures of the type (18) above are relatively rare in geographically more southern Dravidian. It may also account for the fact, noted by S (p. 47-8) that except for 'echo' structures, the use of SV formations has steadily declined in Tamil and Malayalam 'so that it had virtually fallen from the language by the dawn of the early modern period.' For excepting 'echo' structures (and perhaps a few similar ones) which represent special instances of a **morphological** type of quasi-reduplication not limited to verbs, SV formations with their multiple finite verbs would constitute apparent exceptions to the syntactic rules of finiteness and might thus be expected to be eliminated. (S similarly attributes the loss of SV formations in Tamil and Dravidian to the 'tension between the functional and formal treatments of finiteness' (47).7) The fact that SV formations show no signs of attrition in the more northern languages may then reflect the fact that these languages did not participate in the switch to S's system of finiteness, but retained the older system which permitted multiple finite predicates in conjoined sentences and thus provided a precedent (if not a source) for the multiple finite verbs of SV formations.

7. The preceding discussion has dwelt mainly on difficulties with S's analysis. This should not, however, be taken as diminishing the value of his work. As noted before, his monograph presents the most systematic study to date into the question of finiteness in Dravidian, and his conclusions provide significant challenges to the traditional view of Dravidian as obeying the 'Strict OV Constraint'. Linguists interested in Dravidian syntax, general linguistic typology, or South Asian convergence would ignore his findings at their own risk.

The fact that I have proposed a possible alternative to his hypothesis is in fact a measure of the significance of his work. Confronted with the traditional view of Dravidian sentence structure plus a few stray examples (such as (3c) above) indicating that that view does not tell the whole story, it would have been next to impossible to advance the hypothesis. It is only because of S's systematic investigation and well argued analysis that I could even begin to develop an alternative hypothesis.⁸

NOTES

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The following abbreviations are used in the glosses:

- & = conjunction 'and' (or 'also, even')
- abs. = absolutive
- Clit. = clitic
- cond. = conditional
- DO = direct object
- f. = feminine (or non-masculine, in languages with a gender contrast 'masculine : non-masculine')
- fut. = future
- h = honorific (plural)
- IO = indirect object
- imp. = imperative
- m. = masculine
- N = nominative
- n. = neuter
- neg. = negative (verb)
- p = plural
- perf. = perfect
- pres. = present
- Q = quotative marker

S	=	subject
s	=	singular
V	=	verb
VN	=	verbal noun

¹Example (3b) comes from Natarajan 1977 where it is cited without a gloss. The translation given here is a conjecture.

²Strictly speaking, the echoed constituent is not the direct complement of *kāṇe* but of the 'FPEP' *embavana* (from the verbal root *eṇ-).

³S adds: 'More compelling is the fact that Dravidian correlative clauses tend to use some kind of quantification to join together the two clauses of the correlative construction. Although use of the clitic -ō 'or, whether' is the most widespread, the use of pairs of reduplicated interrogative and demonstrative pronouns is also attested ... To the best of my knowledge, Indo-Aryan correlative clauses do not make much use of quantification to form correlative constructions.' Actually, Indo-Aryan does employ structures with doubled relative and correlative pronouns for generalizing propositions of the type Skt. *yo yas tad karoti sa (sa) mūrkaḥ* 'Whoever does this is a fool.'

⁴The Toda form of the verb functions as a conditional but morphologically belongs to a special class of 'subordinating' verbs.

⁵The Tulu structure contains the synchronic equivalent of a conditional (a combination of finite verb plus the conditional particle -aḍa-) followed by the particle -la 'also'.

⁶Toda has an alternative to non-finite relative-clause formation, a structure with finite verb followed by -ō. Emeneau (1984:185-6) observes that for phonological reasons this suffix cannot be inherited and therefore proposes that it is a borrowing from Tamil or Badaga, both of which have -ō. This might suggest that the finite predicate construction preceding the -ō is likewise a borrowing; but it does not require that assumption.

⁷In this context, S proposes, with some hesitation, that the well-known loss of verbal agreement markers in Malayalam may have been another, more radical response to the 'tension' between the two types of finiteness. This is an intriguing proposition. However, there is perhaps another motivation (which may have interacted with the finiteness 'tension'): As Beytham (1943:179) observes, Tamil does not permit predicates to agree with conjoined human and non-human subjects. Instead, we find structures of the type cited in (18c) above and reproduced below, with two coordinate clauses or sentences, each containing its own finite predicate which agrees in gender with its respective subject. Apparently, then, Tamil third-person plural endings can signal agreement either with humans or with non-humans, but not with both.

maṅitar aṛintārkaḷ kutiraikaḷ(-um) aṛintaṅa (Tamil)
 past 3m.p & past 3n.p
 'Men perished and horses perished.'
 = 'Men and horses perished.'

In this regard it is interesting that Toda lacks the usual Dravidian distinctions for gender and number in the third persons of the verb, although like most other Dravidian languages it has distinct endings for the first and second persons, singular and plural. Similarly, Caldwell (1875(1913):484) notes that Telugu preterits may lack tense, person, gender, and number markers for third persons, while other person/number distinctions are always marked. Could it be that Toda (and to a more limited extent, Telugu) gave up agreement in third persons so as to overcome the inability of third-person endings to agree with conjoint human and non-human subjects? If so, could Malayalam have gone one step farther by giving up verb agreement altogether?

⁸Layout and printing of the monograph are well produced, except for a large number of misprints, misspellings, and missing words. Fortunately, most of these are self-correcting. The only passage where mistakes tend to affect comprehension is on pp. 30-36, where there is a recurrent mismatch between the numbering of examples (38) - (44) and the textual references to them. Moreover, the same number, (44), is attached to two different examples (pp. 32 and 36), the second of which contains the important syntactic rule for finiteness. In addition, the discussion (pp. 52-3) of Kota and Toda auxiliary developments is condensed to the point of being almost unintelligible. Fortunately, the later discussion of similar developments in Konda, Pengo, and Tamil (71-77, 78-86) is clear and retroactively helps in understanding S's earlier remarks.

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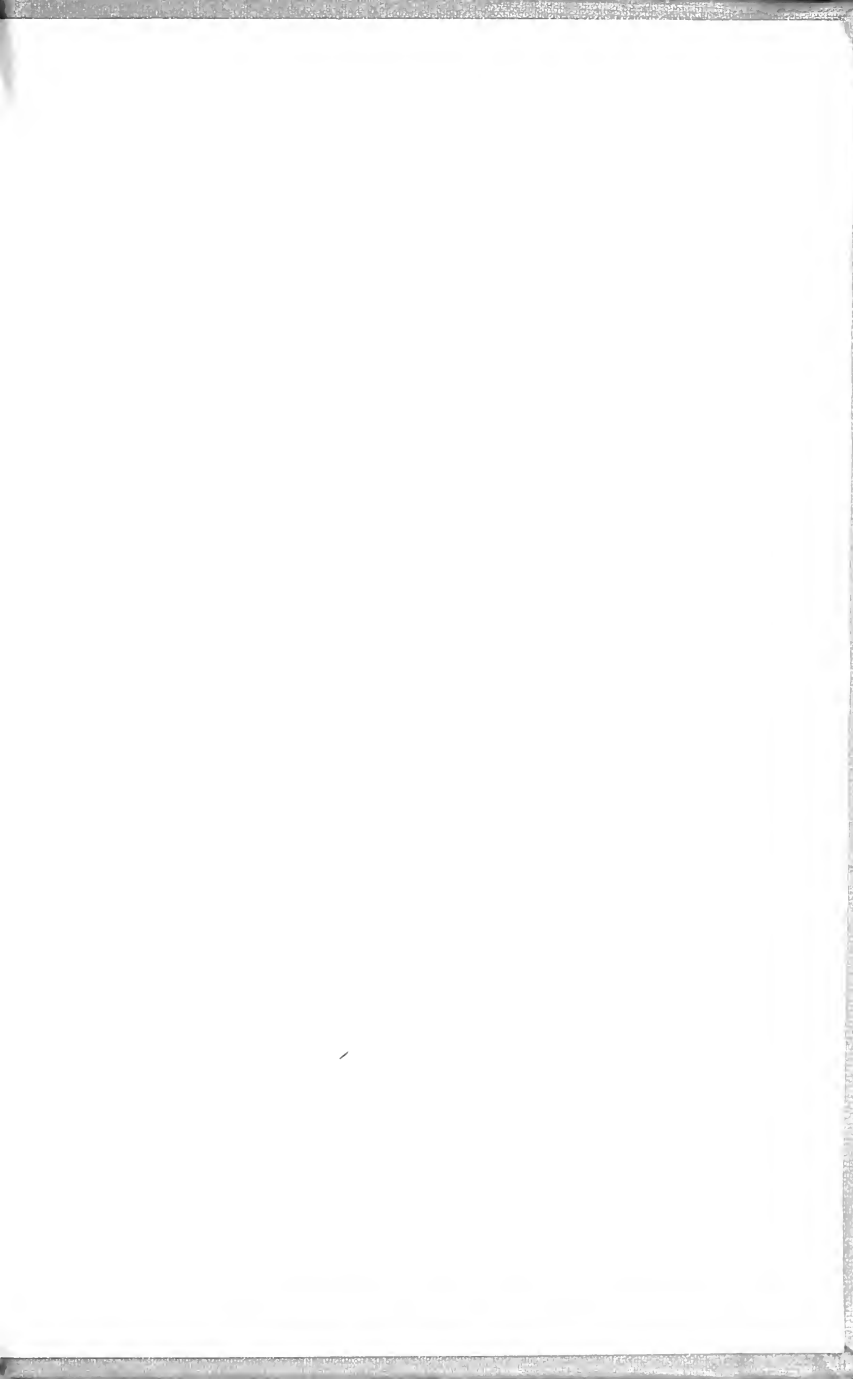
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