

THE HUMAN SPEECH SOUNDS

▼ CHAS. T. LUTHY ▼





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THE HUMAN SPEECH SOUNDS

TRACING THE EVOLUTION OF THE FORTY-THREE SPEECH
SOUNDS IN THE HUMAN VOICE THROUGH ALL THEIR
SERIES, CLASSES, KINDS AND FORMS TO THE LIMIT
OF AUDIBLE DISTINCTION, DESCRIBING THEIR
ORGANIC FORMATIONS, TOGETHER WITH
THE POSITIONS OF THE MOUTH PARTS

AND

ESTABLISHING AND EXEMPLIFYING THE
PHYSIOLOGICALLY CORRECT PRONUNCIATION OF
ALL THEIR NINETY-THREE DIFFERENT FORMS

ALSO

GIVING THOROUGHGOING INFLECTION AND ARTICULATING
EXERCISES, RULES FOR AUDIBLE SYLLABICATION AND
THE LOGICAL NOTATION OF THE SOUNDS

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CHARLES T. LUTHY

PUBLISHER

PEORIA, ILL.



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BROOKLYN, N. Y.

TO THE MEMORY

OF HIS

Beloved Parents

FROM WHOM HE HAS INHERITED WHATEVER ORIGINALITY,
ANALYTIC POWERS, AND LINGUISTIC APTITUDE HE POS-
SESSES, THIS LITTLE TREATISE, THAT HAS BEEN PRO-
DUCED WITH MUCH THOUGHT, IS GRATEFULLY DEDICATED

BY THE AUTHOR

PREFACE

THE world needs a correct analysis of the human speech sounds. One can hardly believe that, in this age of the wireless, of aërial navigation, and of electricity, the human speech sounds are not scientifically understood. Yet such is the case. Not even the number of different sounds in the English language has been determined.

Five English dictionaries, in their keys to the pronunciation, contain the following numbers of different sounds in the language, viz.: Webster's New International, 64 sounds—31 vowels and 33 consonants; the Standard, 49 sounds—31 vowels and 18 consonants; the Century — sounds—32 vowels and — consonants; Worcester's, 55 sounds—35 vowels and 20 consonants; and the Oxford dictionary, 99 sounds—65 vowels and 34 consonants;—thus varying from 49 to 99 sounds. And A. J. Ellis, the great English phonetician, gives 273 different sounds in actual use in English pronunciation.

In the examination of works on phonetics in the Congressional, the New York, and the Boston libraries, the author has not found a single work but what omits sounds, but what confuses sounds, and but what adds spurious sounds. Neither does a single work scientifically trace their evolution from the fundamental sounds through all their series, classes, kinds and forms to the limit of audible distinction or

establish the physiologically correct pronunciation of the sounds. And yet, until such investigation is made, the Universal Alphabet, for which the world is groping, cannot be logically evolved; the simplification of English spelling that has baffled the ingenuity of great learned societies of both hemispheres for many years cannot be scientifically undertaken; dictionaries can neither intelligently explain nor systematically exemplify the correct pronunciation of the sounds; and schools cannot correctly teach their pronunciation either to our native population or to the vast number of foreigners that land on our shores annually, and that must be assimilated.

CHAS. T. LUTHY.

NEW YORK CITY, July 21, 1917.

INTRODUCTION

THE HUMAN SPEECH SOUNDS

MAN is at the head of terrestrial creation. His mind, his power of thinking, is the acme of evolutionary development, and, as the body is the instrument of and corresponds to the mind, organs of speech have developed in man for the purpose of expressing his thought outwardly and communicating it audibly to his kind.

Audible communication consists of speech; speech consists of words; and words consist of sounds. As speech is given man for the purpose of communicating his thoughts to his kind—to all his kind—to enable him to do so intelligently, mankind has organs of speech that are alike, and that utter sounds that are alike.

Therefore, the utterance, that is, the pronunciation, of the speech sounds has been as unchangeable, throughout the ages, as are man's lips, teeth, gums, etc.,—the organs that produce them. Noah, Solomon and Paul; Homer, Shakespeare and Hugo; Johnson, Webster and Worcester;—if their organs of speech were normal, and they formed the sounds organically correctly, uttered the respective sounds alike. That human voices are alike is confirmed in human anatomy; in that every voice, male and female, changes register at *F*; and in that English missionaries learn all languages and all nations learn English.

The subject will be considered under the five divisions: I. The Evolution of the Speech Sounds; II. Their Organic Formation; III. The Exemplification of their Pronunciation; IV. The Notation of the Sounds; and V. Thoroughgoing Articulating Exercises.

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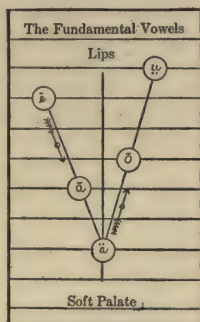
THE HUMAN SPEECH SOUNDS

I

THE EVOLUTION OF THE SPEECH SOUNDS *

1. First. Of the vowels. The evolution of the vowel sounds will be considered under: (1) The Fundamental; (2) The Mixed; (3) The Long and the Short; (4) The Forms of the Vowels; (5) The Diphthongs; and (6) Diagrammatic View of Vowel Evolution.

2. (1) The Fundamental Vowels. When one imitates the call of the cat (*mēāāōy*—Webster's markings), he utters the five vowels, the *ē*, *ā*, *ā*, *ō*, *y*. As these five vowels inhere in the voices of some of the higher order of animals, as the monkey, the cat, and the dog, and as they are common to the voices of all mankind,—from Hottentot to German,—man undoubtedly brought these five speech sounds with him from his animal ancestor stage, and they are, therefore, the five fundamental vowels. From them all other vowel sounds are derived.



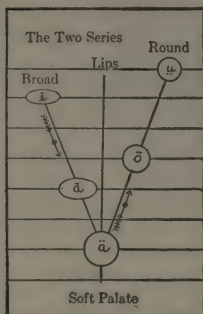
3. In uttering the five fundamental vowels in their natural order, as uttered by the cat, one starts from

* The order of evolution herein given is intended as the logical, not as the chronological order.

a closed mouth, proceeds to a wide open mouth, thence again to a closed mouth,—from start to finish a complete round,—as is shown in the foregoing diagram. These five sounds grade, qualitatively, into kind by about equal differences, and they compose one series to which each sound bears such a relation as the colors of the rainbow do to the rainbow itself—the relation of parts to a whole.

4. The Broad-Lipped and the Round-Lipped Series.

Then when one considers the lip adjustment in the



formation of the five sounds he will discover that the \bar{e} , \bar{a} , \bar{a} are broad-lipped, that is, that the \bar{e} is made with the lips broad, from side to side, and the aperture not rounded, and that the mouth is but little open; that the \bar{a} is made with the lips likewise broad, from side to side, and the aperture comparatively more rounded, and that the mouth is decidedly more open; and that the \bar{a} is made

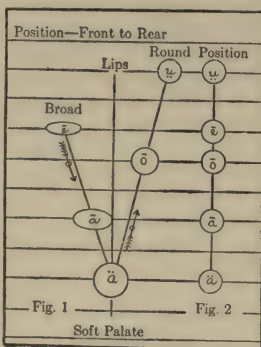
with the lips likewise broad, from side to side, and the aperture quite round, and that the mouth is wide open. And that the \bar{a} , \bar{o} , \bar{u} are round-lipped: that is, that the \bar{a} is made with the lips and the aperture round, and that the mouth is wide open; that the \bar{o} is made with the lips and the aperture round, and that the mouth is decidedly less open; and that the \bar{u} is made with the lips and the aperture round, and that the mouth is very little open. It will thus be seen that the five fundamental vowels also constitute two subseries of which the former is the broad-lipped and the latter the round-lipped; and that the \bar{a} is the

common, back terminal of the two series and partakes of the nature of both;—all as shown in the foregoing diagram.

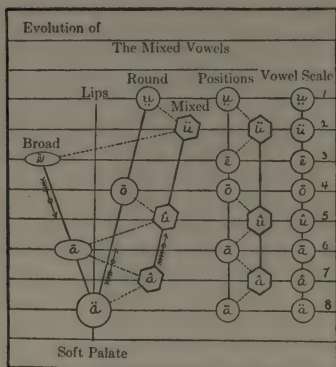
5. (2) **The Mixed Vowels.** Then when one considers the five fundamental vowels as to their essential places of formation in the mouth, from front to rear, they arrange themselves in lineal order as shown in Fig. 2, in the accompanying diagram. This shows that from the y to the \bar{e} , from the \bar{o} to the \bar{a} , and from the \bar{a} to the \bar{a} , there are, in each case, two vowel spaces; that is, there is a vacancy—an unfilled gap—between each of said two vowels. If the mouth could have put itself into position to fill these gaps with like fundamental vowels, it would undoubtedly have been done; the gaps show that this could not be done.

6. As “nature abhors a vacuum,” she filled the vacancies by combining the two sounds adjoining each of said gaps and thus, by the simultaneous utterance of the two sounds and their fusion into one, produced a series of three mixed sounds to complete the vowel scale, viz., the blending of the \bar{a} and \bar{a} , of the \bar{o} and \bar{a} , and of the y and \bar{e} , which produced the \hat{a} , \hat{u} , $\hat{ü}$, respectively, corresponding to the German umlauts;—all as shown in the following diagram.

7. **Only Three Mixed Vowels.** It would seem, at first thought, that any two fundamental vowels should combine and produce a mixed vowel; but such is not



the case. A mixed vowel is produced by combining the mouth adjustment of a round-lipped vowel with that of its compatible broad-lipped vowel, as shown



in the accompanying diagram. No others combine. To demonstrate this, let one, who can utter these sounds correctly, put and firmly hold his mouth in position to articulate, for example, the u and then adjust internally, only, for the \bar{a} , and, while the mouth is in this double position,

let him try to utter the \bar{u} and he can, by directing his attention thereto, discover that the internal \bar{a} adjustment changes over to the \bar{e} adjustment. When mixed sounds are attempted to be produced from incompatible mouth positions, the adjustment will, on uttering the sound, either change to compatible positions or the sound will be perverted.

8. (3) The Long and the Short Vowels.—(a) **The Long Vowels.** The eight vowels, that, when arranged according to their places of formation in the mouth from front to rear, as above, constitute the vowel scale, are the long or class vowels, and all further modifications of each of the eight belong to its class. (See page 11.) When not uttered for the purpose of contrasting their places of formation, the natural order of utterance of the eight would seem to be \bar{e} , \bar{a} , $\bar{ä}$, \bar{o} , u — \hat{a} , \hat{u} , \bar{u} . These eight class vowels vary by about equal differences, and

they are as distinct, as exclusive, and as dominant as are the cardinal points of the compass; therefore, as when a star is anywhere near the north star such star is in the northern heavens, so when a vowel sound sounds anything like any one of these eight class vowels, such vowel is either that class vowel or is one of the kinds and forms—pure or perverted—into which that class vowel varied. To interpose other class vowels, as for example the *ô* perversion of English dictionaries, breaks down nature's distinction and causes confusion in the expression of thought. (See post, page 71, Note 1.)

9. (b) The Short Vowels. The next modification of the vowels consisted in the common differentiation of each of the eight long, or class

vowels, into a long and a short kind. In the rapidity of speech, the mouth, in most cases, does not have time enough to assume, and during the time of the utterance hold, the exact, close, firm, settled position required to articulate the long vowel sound, and, therefore, only approximates its position and utters in a more open, loose and, as it were, transitory position a sound which is not identical with but which, classically, approximates the sound of the long vowel.

Evolution of	
The Short Vowels	
Long	Short
ū	u
ü	ü
ē	ĭ
ō	ô
û	ê
ā	ä
â	ă
ä	ç

This has given rise to a correlative short for each of the eight long vowels, viz., the *ĭ*, *ĕ*, *ô*, *ô*, *u*—*ă*, *ē*, *û*, and which arranged according to place of formation, as above, constitute the *short* vowel scale.

NOTE. The *ă*, *ē*, *û* are blendings of short vowels to correspond with the blendings in their correlative long, the *â*, *û*, *ü*.

10. (c) Vowel Inflection. The short vowels do not differ from the long vowels only quantitatively but also qualitatively, and in both respects the two of each pair vary by a common difference, so that when such difference is not made in any couplet, either one or both of its sounds are pronounced incorrectly. As a correct understanding of such difference is essential the following inflection exercise should be practiced until one acquires the correct pronunciation of all the vowels.

VOWEL INFLECTION *

LONG				SHORT				COUPLETS		
Type	Inflection				Type	Inflection				Inflection
meed	ē	mē	ēd	mēd	pit	ī	pī	īt	pīt	(meed) ē—ī (pit)
made	ā	mā	ād	mād	pet	ě	pě	ět	pět	(made) ā—ě (pet)
far	ǎ	mǎ	ǎd	mǎd	not	ǒ	pǒ	ǒt	pǒt	(far) ǎ—ǒ (not)
mode	ō	mō	ōd	mōd	ton	ó	pó	ót	pót	(mōde) ō—ó (ton)
rude	ұ	mұ	ұd	mұd	put	ү	pү	үт	pүт	(rude) ұ—ү (put)
fad	â	mâ	âd	mâd	ask	ǎ	pǎ	ǎt	pǎt	(fad) â—ǎ (ask)
burn	û	mû	ûd	mûd	pert	ē	pē	ēt	pēt	(burn) û—ē (pert)
grün	ü	mü	üd	müd	Glück	ü	pü	üt	püt	(grün) ü—ü (Glück)

* Read the columns downward except the last, the inflection column, in which read the two words, then the two sounds, etc., down the column. Bring out a uniform, common couplet difference. The ü sound occurs in English as the initial element of the diphthong Iy in *few*, *mew*, *new*, etc.

11. (4) The Forms, or Minor Modifications, of the Vowels. With the evolution of the short vowels, the differentiation into different *kinds* of vowels ceased; no more different vowels are possible in the present stage of development of the human voice. All further modifications of the vowels, therefore, are of a minor character that do not make more *kinds* but that

simply vary the vowel, within itself, into the different *forms* to suit the different conditions under which it occurs.

12. Necessity for the Different Forms. As in the progress of speech consonants evolved, some emerged with which the broad form of the long vowels could not fluently combine. Such form requires a maximum tensioning of mouth parts and a minimum quantity of breath; short vowels require a minimum tensioning and a maximum quantity of breath. Consonants differ likewise. Such opposite factors in successive sounds are not conducive to their fluent combining; to be compatible, the two sounds must, approximately, correspond in the two factors so that those of the preceding sound can easily and smoothly transform into those of the succeeding sound. Both vowels and consonants, therefore, modified into forms that materially differ in such requirements and that, thus, adapt them, reciprocally, to combine more easily and more fluently with one another.

13. (a) The Quantitative Forms. The first modification that will be considered consisted in each long vowel varying within itself by a common, quantitative difference into two forms, viz., one that will be designated as the broad, and a form, a little shorter in quantity than the other, that, for reasons that will hereinafter appear, will be designated as the medium form; as the *ē* in *meed—peet* and the *ā* in *made—fate*. The short vowels have no recognizable quantity and could not, therefore, vary into quantitative forms.

14. (b) The Accentual Forms.—Emphasis, Accent, Stress. Emphasis is the audible prominence given to a word and consists of quantity, stress, pitch, dis-

tinctness of utterance and of other qualities of the voice, or of some of them. Accent is the audible prominence given to a syllable or to a vowel. In the syllable it consists of stress, quantity of the vowel, attaching a consonant to the vowel, etc., or of some of them. In a vowel it consists principally of quantity and of stress, or of stress alone. Stress is force or loudness of utterance and is relative, yet it cannot be wholly wanting or the sound would be inaudible; and while between the loudest scream and the just audible sound there are many degrees of stress, the degrees have no audible demarkations or defined gradings. The relativity is all that there is to guide one in distinguishing them.

15. 1st. Gradation of Accent. The diminishing degrees of accent can be seen when each of the eight words in the following accentual inflection table is pronounced from left to right with equally diminishing degrees of stress from primary to obscure. The inflection shows that the different degrees of accent have no audibly distinct demarkations either in the force of utterance or in the quantity or in the quality of the sound—an *ě* remains an *ě* through all the diminishing degrees of accent. The stress should be strong on the primary and only enough on the obscure to make it just audible.

2d. ACCENTUAL INFLECTION OF THE SHORT VOWELS

PRIMARY TO OBSCURE

DEGREES OF ACCENT

Primary	2d	3d	4th	5th	Obscure
Pĭt	Pĭt	Pĭt	Pĭt	Pĭt	Pĭt
Pĕt	Pĕt	Pĕt	Pĕt	Pĕt	Pĕt
Pöt	Pöt	Pöt	Pöt	Pöt	Pöt
Pòt	Pòt	Pòt	Pòt	Pòt	Pòt
Pùt	Pùt	Pùt	Pùt	Pùt	Pùt
Păt	Păt	Păt	Păt	Păt	Păt
Pēt	Pēt	Pēt	Pēt	Pēt	Pēt
Püt	Püt	Püt	Püt	Püt	Püt

NOTE. It will be seen from the foregoing inflection that there is no just foundation for English dictionaries representing the obscure accentual form of the vowels in *several* classes by the *same* symbol, nor for eliding such obscure forms—an ě remains an ě through all the diminishing degrees of accent.

16. (c) **Of the Short Vowels.** The only modification of which the short vowels admit is the accentual; and it appears in three forms, the primary, the secondary and the obscure, as the ĭ in *pĭt'*—*outfit'*—*profit'* and the ě in *pet'*—*sunset'*—*millet'*; no other accentual forms are practicable. Although accent is relative, the primary is easily discernible, and any short vowel that has not a primary accent but has a fairly perceptible accent falls into the middle class, the secondary. Between the secondary and the most obscure there may be many degrees, but they are not perceptibly graded and are not practically distinguishable. Therefore all below secondary fall into the obscure. The

three accentual modifications are common to the short vowels in all the eight classes.

NOTE. The three accentual modifications of the short vowels carry the modifications of the vowels to the limit of audible distinction; finer modifications are not discernible in fluent speech. (See *The Limit of Audible Distinction*, page 26.)

17. (d) Of the Long Vowels. In the long vowels the quantitative seems to be the principal modification and the accentual the subordinate; for both the broad and the medium forms are always under a primary accent. The long vowels, however, also occur under a secondary accent, as the *ē* in *con'crete'* and the *ā* in *prel'ate'*, and when they so occur, the modification will be designated as the narrow form. The medium and the narrow forms have like quantity but as the medium takes the *primary* accent of the broad form and the *shorter quantity* of the narrow form, it partakes of the characteristics of the two, and has, therefore, been designated as the *medium* form. The three forms, the broad, the medium and the narrow, appear in *meed'—peet'—con'crete'* and in *made'—fate'—prel'-ate'*. The three forms are common to the long vowels in all the eight classes.

18. (e) The Forty-eight Forms of the Vowels. As each of the eight long vowels has thus varied into three, quantitative-accentual forms, and each of the eight short vowels has thus varied into three accentual forms, that gives, cumulatively, 48 forms for all the vowels. The eight classes of the vowels, the long and the short kind in each class, and the three forms of the long and the three forms of the short will now be shown in contrast.

THE FORTY-EIGHT FORMS OF THE VOWELS *

Class	THE LONG VOWELS			THE SHORT VOWELS		
	Broad	Medium	Narrow	Primary	Secondary	Obscure
ē	meed'	peet'	concrete'	pit'	outfit'	profit°
ā	made'	fate'	prelate'	pet'	sunset'	millet°
ä	far'	taught'	Utah'	not'	whatnot'	despot°
ō	mode'	note'	antidote'	ton'	grandson'	lesson°
u	rude'	flute'	Hindu'	put'	output'	cheerful°
â	fad'	path'	program'	ask'	potash'	damask°
û	burn'	burnt'	suburb'	pert'	outskirt'	concert°
ü	<i>grün'</i>	<i>blüht'</i>	<i>Ungefüh'</i>	<i>Glück'</i>	<i>Mundstück'</i>	<i>Unglück°</i>

* Read each line across the page. The (') , (') and (°) are used to indicate the primary, secondary and obscure accents, respectively.

19. (5) Vowel Diphthongs, or Compound Vowels. The neutral vocal current is the "potter's clay" that is moulded into the different *kinds* of vowels by the mouth parts, and as by the evolution of the mixed and of the differentiation of the long into the short, the only two ways of producing vowels of different kinds were exhausted, all further increase in the number of vowels lies in the line of compounding them into diphthongs.

20. (a) How Compounded. A vowel diphthong consists of the combination, in one syllable, of two short vowels so uttered at one impulse that they do not fuse into one, mixed sound and yet have the effect of a single sound. Diphthongs have two successive parts to their sounds, an initial and a vanishing part; and as the two parts must be uttered at one impulse, that is, in so short a space of time as to make one syllable of them, only a small fraction of time can be allowed to each in its utterance, wherefore short vowels alone can be combined into *true* diphthongs.

21. (b) The Diphthongal Range. The whole number of true, vowel diphthongs within the compass of the voice—each short vowel coupled with every other short vowel—is 56, as follows:

THE FIFTY-SIX PURE VOWEL DIPHTHONGS,
WITHIN THE COMPASS OF THE VOICE *

īē	ēī	ōī	ōī	ūī	āī	ēī	ūī
īō	ēō	ōō	ōō	ūō	āō	ēō	ūō
īu	ēu	ōu	ōu	ūu	āu	ēu	ūu
īē	ēē	ōē	ōē	ūē	āē	ēā	ūā
īū	ēū	ōū	ōū	ūū	āū	ēū	ūē

* Read the columns downward.

NOTE. Every child, while its organs of speech are pliable, should be drilled on the 56 pure vowel diphthongs until the child is capable of uttering every one easily, smoothly and correctly. In this way such diphthongal errors as *duǎn*, *ǎut*, *ǎil*, *hǎst*, *āil*, *shōu*, etc., can be intelligently pointed out and corrected.

22. (c) Impure Diphthongs. In the true, or pure, diphthongs both parts are short, in quantity, whether the syllable is accented or not; as in *boil*—*turmoil*, *foul*—*lookout*, *ice*—*idea*, etc. In the impure diphthongs, one part is a long vowel and this may be either first as in *dear*, *share*, *lower*, as popularly pronounced; or it may be last as in *feud*, *union*, *familiarity*. When the long element is last, it may take either the broad, the medium or the narrow form, as the *u* in *feud*, *feudal*, *curfew*; when the long vowel is first, it may take either the medium or the narrow form as in the *ōē* in *mower*, and the *ōē* in *downpour*, respectively, as popularly pronounced.

NOTE. With the eight long vowels combining in two forms as the initial and in three forms as the terminal part, with each

of the eight short vowels, gives 320 impure vowel diphthongs in the human voice.

23. (6) The Evolution of the Simple Vowels in Diagrammatic View. The evolution of the simple vowels from the five fundamental sounds into all their series, classes, kinds and forms to the limit of audible distinction, shown in diagrammatic view in conformity with the foregoing analysis, is as follows:—

ANALYTIC DIAGRAM SHGWIN THE EVOLUTION OF THE SIMPLE VOWELS INTO SERIES, CLASSES, KINDS AND FORMS *

The Three Series	The Long Kind.			The Short Kind.		
	Quantitative Forms			Accentual Forms		
Position	Broad Medium Narrow			Primary	Secondary	Obscure
Round Lipped	Vowel Scale			u	u'	u°
Lips				ü	ü'	ü°
Mixed				ö	ö'	ö°
Broad Lipped				o	o'	o°
				e	e'	e°
				ê	ê'	ê°
				ë	ë'	ë°
				ä	ä'	ä°
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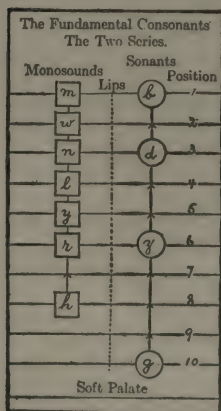
into primary, secondary and obscure accentual forms. (See pages 1-11.)

24. Second. Of the Consonants. The evolution of the consonants will be considered under (1) The Fundamental; (2) The Mixed; (3) The Sonants and The Surds; (4) The Forms of the Consonants; (5) Diagrammatic View of Consonant Evolution; and (6) Diphthongs and Triphthongs.

25. (1) The Fundamental Consonants. The fundamental consonants in the human voice are the *b, d, g* (as in *dog*), *h, l, m, n, r, w, y* and *z*. From these eleven consonants all other consonant sounds are derived.

26. The Sonants and the Monosounds. These eleven consonants consist of two fundamental, parallel series, viz.: of the seven monosounds, the *h, l, m, n, r, w* and *y*; and of the four sonants, the *b, d, g* and *z*.

27. (2) The Mixed Sonants. When the individual

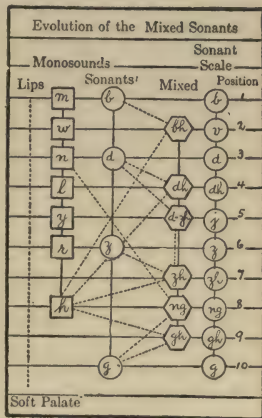


consonants that compose these two series are paralleled according to their places of formation in the mouth from front to rear, as shown in the accompanying diagram, it will be seen that in the monosounds there is a gap, an unfilled space, between the *r* and the *h*; and that in the sonants there is a gap, one unfilled space, between the *b* and the *d*; a gap, two unfilled spaces, between the *d* and the *z*; and a gap, three unfilled spaces, between the *z* and the *g*. If these

spaces could have been filled with like fundamental consonants it would undoubtedly have been done.

The vacancies show that there was no way in which the voice could so fill them.

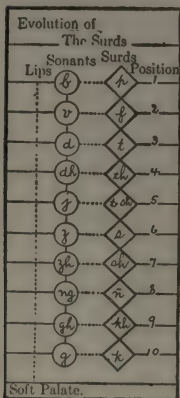
28. To fill these vacancies,—these spaces in the mouth where additional consonants *can* be placed,—nature, as it did in the case of the vowels, fused the compatible sounds,—monosounds with sonants, neither kind being fusible within itself,—as shown in the accompanying diagram. Between the sonants, space 2 was filled by fusing $b-h(=v)$; space 4 by fusing $d-h$ (as in *lathe*); space 7 by $z-h$ (as in *rouge*); space 8 by $n-g$ (as in *long*); space 9 by $g-h$ (as in *Tag*, German);



and space 5 by the compound fusing $d+(z-h)(=j)$. The gap between the monosounds r and h is unfilled, there being no way in the voice to fill the vacancy. The six mixed sounds produced by the fusions, as above, are sonants and complete the sonant scale. (See page 16, for the mixed surds.)

29. **Mixed Consonants are Simple.** By such blending of the two consonants, the two fuse into one, mixed sound, in which, as is the case with the mixed vowels, the individual sounds are so modified as to lose their separate identities and each element is heard throughout the entire utterance of the sound. Mixed consonants, like mixed vowels, although composite, are, therefore, simple, not compound. The j ($d+(z-h)$) and the ch ($t+(s-h)$) are compound mixed and are, therefore, exceptions. (See post, page 60.)

30. (3) The Sonants and the Surds. To facilitate the fluency of speech and to give to the voice a greater range of expression, there has evolved from each



sonant a correlative surd, that bears approximately the same relation to its sonant as a short vowel does to its correlative long. These ten surds are the *p*, *f*, *t*, *th* (as in *thin*), *t-sh* (= *ch*, as in *check*), *s*, *sh* (as in *shun*), *n̄* (as in *mon-key*), *kh* (= *ch*, as in *ach*, German), and *k*—as shown in the accompanying diagram. These ten surds arranged from front to rear according to the place of formation in the mouth constitute the surd, consonant scale.

31. The mixed surds are fusions of basic surds with monosounds that correspond with the fusions of basic sonants with monosounds in the correlative, mixed sonants. Notice that all the mixed consonants (both sonants and surds) are blendings with the *h* except the *ng*—*n̄*.

NOTE. *The Imperfect n̄ Sound.* In the fusions of the *b-h*, *d-h*, *z-h*, *g-h*, and their correlative surds, the *p-h*, *t-h*, *s-h*, *k-h*, the terminal factor, in each case, is the *h*, that, as will appear later, is an elastic consonant susceptible of changing its form; and this is true in the fusion of the *n-g*—the *g* also being elastic and susceptible of changing its form. But, in the latter's correlative, mixed surd, the *n-k* (?), when the *n* modified to fuse with the *k*, its affinity, as the *k* is a surd, and surds are inelastic, the *k* could not and did not change to fuse, and that left the *n*, in its changed form, alone. The *n̄* is, therefore, an imperfect sound, being one of two sound factors for a mixed surd for which the other factor is wanting in the human voice.

The *n̄* sound combines with the *k* as in *bank*, and ends a syl-

lable within the word as in *mon-key*, etc., but is not adapted for a final position as in such it has a demoralizing nasal effect upon the preceding vowel, as can be seen in the French *mon, son, vin*, etc. Possibly it is on that account that the sound has not been appropriated for a final position in the English and German languages.

32. The *h, l, m, n, r, w* and *y* were incapable of modifying into a surd *kind* and are, therefore, herein designated as monosounds; that is, single sounds. They do not vary in two *kinds* of sounds.

33. (4) The Forms, or Minor Modifications, of the Consonants. With the evolution of the mixed consonants, and the variation of the sonants into surds, the modification of the consonants into different *kinds* of sounds ceased, no more *different* consonants being possible in the present stage of development of the human voice; therefore all further modifications of the consonants, as was the case with the vowels, are of a minor character that do not make more *kinds* but that simply vary the sound within itself into different *forms* so as to adapt the sound to connect under the different conditions in which it occurs.

34. Necessity for the Different Forms. The modifications of consonants into different forms grew out of the necessity of their having to connect with one another and with the vowels. Therefore, where, in successive sounds, the tensioning of mouth parts and the manipulation and the quantity of the breath were so different that the sounds were physiologically incapable of fluently connecting, they varied into forms that mitigate such requirements so as to admit of their so connecting.

35. (a) The Voiced and the Voiceless Forms. The only variation of the consonants into minor modifi-

cations consisted in each sonant and each monosound varying into a voiced and a voiceless form as the *b* in *lobe*—*bet* and the *m* in *boom*—*met*. The surds were incapable of so modifying, they have only one, a not-voiced, form, and the surds are, therefore, monoforms.

NOTE. The broad form of the vowels requires so firm an adjustment and so little breath that when changing to the voiceless form of the consonants with its very opposite factors, the change in the adjustment cannot be made instantaneously, wherefore the voicing keeps on decreasingly so as to form a connecting link. Compare the *b* in *lobe* and in *bet*. The former consists of two parts, viz., of the voiced element as the initial part, and of the voiceless *b*, exactly as in *bet*, as the terminal part,—the two composing the voiced form of the *b*. Without such connecting link the broad form of the vowel cannot connect with the voiceless form of the sonants and monosounds. A surd can not connect with a following, voiced form.

36. (b) The Forty-five Forms of the Consonants.

As by the fusion of the four, fundamental sonants with monosounds, six mixed sonants were produced; as by the modification of the ten sonants, ten surds were produced; and as by the minor modification of the sonants and of the monosounds, a voiced and a voiceless form was produced for each of such elastic consonants; this, with the ten surds (they being monoforms), gives, cumulatively, 45 forms for all the consonants—the *r* taking two, voiceless forms.* In order to fix the ten sonant and surd couplets, the seven monosounds, and the modifications into the 45 forms, indelibly in the mind, the following inflection exercises should be practiced:

* See pages 64 and 65.

(c) CONSONANT INFLECTION *

THE SONANTS			THE SURDS		CORRELATIVE
Voiced	Voiceless	Couplets	Not Voiced		Triplets
lobe	bet	b—b	pat	p	b—b—p
eve	vet	v—v	fat	f	v—v—f
feed	din	d—d	ten	t	d—d—t
lathe	then	dh—dh	thin	th	dh—dh—th
age	jack	j—j	check	t-sh	j—j—t-sh
haze	zip	z—z	sit	s	z—z—s
rouge	azure	zh—zh	shun	sh	zh—zh—sh
long	sing	ng—ng	mon-key	ñ	ng—ng—ñ
Tag	legen	gh—gh	ach	kh	gh—gh—kh
dog	got	g—g	kit	k	g—g—k

THE MONOSOUNDS			
Voiced	Voiceless	Couplets	
		Voiced	Voiceless
boom	met	m—m	
dean	net	n—n	
vail	let	l—l	
burr {	timber	r—r	
	rot	r	
beew†	wet	w†—w	
beey†	yet	y†—y	
beeh†	hot	h†—h	

* Read each line across the page.

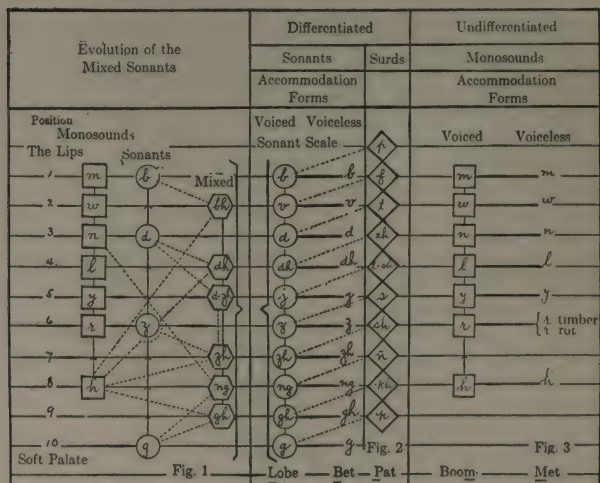
† Improvised words. The consonants, in these final positions, must be given their voiced forms. (See post, page 86.)

NOTE. The *r* has both an untrilled and a trilled voiceless form. (See pages 64, 65.) The modification of the sonants and the monosounds into voiced and voiceless forms carried the modifications of the consonants to the limit of audible distinction.

37. (5) The Evolution of the Consonants in Diagrammatic View. The evolution of the consonants

from the seven fundamental monosounds and the four fundamental sonants into the mixed sonants, of the sonants into surds, and of the monosounds and sonants into voiced and voiceless forms to the limit of audible distinction, shown in diagrammatic view in conformity with the foregoing analysis, is as follows:

ANALYTIC DIAGRAM SHOWING THE EVOLUTION OF
THE SIMPLE CONSONANTS INTO SERIES, MIXED,
KINDS AND FORMS



NOTE. Fig. 1 shows the fundamental series—the seven monosounds and the four sonants—and, from their blendings, the evolution of the six mixed sonants; Fig. 2 shows the ten sonants arranged according to place of formation from front to rear into a sonant scale, their variation into voiced and voiceless forms, and the evolution of the correlative surds out of the sonants; Fig. 3 shows the monosounds arranged according to place of formation from front to rear and their variation into voiced and voiceless forms. (See pages 14-19.)

38. (6) Consonant Diphthongs and Triphthongs. As by the evolution of the mixed sonants, and of the surds, the only two ways of producing more or different kinds of consonants were exhausted, all further increase in their number, as was the case with the vowels, lies in the line of compounding them into diphthongs and triphthongs.

39. (a) How Compounded. As consonants, with few exceptions, are not uttered alone, but only in combination with vowels, the compounding occurs in connection with them; and consonants attach either before or after the vowel. The compounding indicates that to constitute a diphthong or triphthong, the consonants that compose it must not simply touch or abut against the vowel and against each other, but must, in some way, dovetail, as it were, into one another—must make a closer union.

40. 1st. Attaching after a Vowel. In forming a vowel, the mouth opens; and in forming a consonant the mouth, as it were, first closes and then opens. Therefore, when a vowel and a following attached consonant are uttered, the process is opening—closing—opening the mouth; the three steps are all complete—there is no shortening, no syncopating the process, no dovetailing of the sounds. Therefore when attached consonants *follow* a vowel they do not constitute diphthongs or triphthongs.

41. 2d. Attaching before a Vowel. When a preceding consonant attaches to a vowel, the full process would be closing—opening—opening the mouth; but the opening of the mouth for the consonant may, *at the same time*, serve as the opening of the mouth for the vowel, so that the process is syncopated, or shortened, and the consonant, in its formation, dovetails

into the vowel. When then, further, the second preceding consonant is likewise adapted, in its organic formation, to connect closely with the latter consonant, the two in that position, constitute a consonant diphthong. When three consonants so combine they constitute a consonant triphthong. Such compound consonants have the effect of a single consonant.

42. 3d. Compatible Mouth Adjustment. Such close connecting of the two consonants grows out of the compatibility of their mouth adjustments; that is, of the mouth adjustment for the latter consonant being begun before the former consonant is quite uttered, or of the mouth adjustment changing from the former to the latter without a break. Take, for example, the *br*: as the particular position for the tip of the tongue is not *essential* to the formation of the *b*, when this sound is uttered in connection with a following *r*, the tip of the tongue, *during* the utterance of the *b*, goes into the position for the *r*; *br*, therefore, forms a diphthong. Contrast this with the succession or break in the mouth adjustment for the *ngp* and for the *td*.

43. 4th. Audible Syllabication Determines. The test for a compound consonant is in audible syllabication, as follows: When after an unaccented vowel, or after a long vowel, the following two or three consonants attach to the succeeding vowel, as would a single consonant, as in *a-breast*, *a-glow*, *a-stride*,—*ea-glet*, *day-spring*, etc., they constitute consonant diphthongs and triphthongs, respectively.

44. (b) The Number of Consonant Diphthongs and Triphthongs in the Human Voice. On considering, somewhat hastily, the different, initial consonant combinations, in the human voice, the author found only

31 two-sound and 5 three-sound that physiologically make such close unions as to constitute them diphthongs and triphthongs; the list embraces as follows:

THE CONSONANT COMPOUNDS IN THE HUMAN VOICE

Initial Sound	DIPHTHONGS				TRIPHTHONGS
	Surds		Sonants	Mono.	
	Surd-Surd	Surd-Mono.	So-Mono.	Mono.	Surd-Surd-Mono.
p		pl, pr			
f		fl, fr			
t		tr, tw			
th		thr, thw			
s	sk, sp, st	sl, sm, sn, sw			skr, skw, spl, spr, str
sh		shl, shm, shn			
"		shr, shw			
kh		khl			
k		kl, kr, kw			
b			bl, br		
d			dr		
g			gl, gr, gw		
h				hw	

These compound consonants, both diphthongs and triphthongs, can be practiced by uttering each before each of the eight long vowels, thus: skē, skā, skä, etc.; and likewise with each of the eight short vowels.

NOTE 1. It is possible that the number of consonant diphthongs and triphthongs may vary a little in different voices. On account of the slight differences in the anatomic formation of the speech organs of different individuals, one may possibly be able to combine two consonants so smoothly as with him to constitute a diphthong while in another it would not. Habit may likewise affect different persons.

45. Third. Syllabication. As the same principle which controls the compounding of consonants largely

governs audible syllabication, that subject will be considered at this place.

46. (1) Visual Syllabication. Both in printed and in written documents, it frequently becomes necessary, at the end of a line, to divide a word,—to place part of it on the following line,—and the only logical way to make such division, is to have it conform to audible syllabication. As every vowel (?) constitutes a syllable, it is evident that the division must be made between the vowels; but to which of the two vowels the intervening consonant or consonants attach is not so clear. The attachment is in conformity with physiological principles,—along the line of least resistance,—as the following shows.

(2) Audible Syllabication. *One Intervening Consonant.*

RULE 1. *A single intervening consonant between two unaccented short vowels attaches to the latter vowel; as in*

*val-e-dic-to-ri-an a-bil-i-ty con-ser-va-tive
con-tra-ri-ness.*

The reason therefor is, as has been shown, that a consonant attaches with less effort to a succeeding than to a preceding vowel.

RULE 2. *After a long vowel, a single intervening consonant attaches to the following vowel; as in*

da-ting ea-gle fa-ther foo-ling loa-fing mo-ment.

The reasons therefor are as follows: (1) as in Rule 1; (2) the change in the mouth adjustment from vowel to consonant can better be made between the syllables than within one; (3) a long vowel develops better when it ends a syllable, as it has more time to develop.

RULE 3. *In all other cases, a single intervening consonant attaches to the vowel with the stronger accent; as in*

abb-ot—a-bove, app-le—a-ppeal, opp-o-site—o-ppose.

The reason therefor is that attaching a consonant to a vowel helps to give it accent—particularly if it attaches to a preceding vowel. (See page 21.)

Exceptions to the Three Rules. In English, intervening *h*, *w* and *y* now always attach to the succeeding and *ng* to the preceding vowel.

NOTE. Accented vowel diphthongs have the effect of long vowels; as in

i-dol loi-ter pow-der eu-chre.

Two Intervening Consonants.

RULE 4. *After an unaccented short vowel and after a long vowel, an intervening consonant diphthong—two consonants that have the effect of a single consonant—attaches to the following vowel; as in*

a-thwart be-twixt de-bris pro-claim re-flect
a-pril ma-tron ea-glet lu-cra-tive pu-trid.

The reasons therefor are as given for Rules 1 and 2.

RULE 5. *In all other cases of two intervening consonants, the two separate, the former attaching to the preceding and the latter to the succeeding vowel; as in*

ab-sent con-tain fer-vent in-volve mus-tard
bod-kin den-tal es-cape gar-bage cum-ber.

The reasons therefor are as follows: (1) The brief interval between the syllables gives time for the change in the mouth adjustment from the former consonant to the latter; (2) the second consonant combines with less effort with the succeeding vowel; and (3) some

consonants cannot fluently combine and therefore separate.

Three or More Intervening Consonants.

RULE 6. *After an unaccented short vowel and after a long vowel, an intervening consonant triphthong—three consonants that have the effect of a single consonant—attach²⁰ to the following vowel; as in*

a-squint be-splatter de-scribe de-stroy day-spring.

The reasons therefor are as given for Rules 1 and 2.

RULE 7. *In all other cases of three or more intervening consonants, the first attaches to the preceding and the last to the succeeding vowel, and of the remainder as many, as more easily can, attach to the succeeding and the others to the preceding consonant; as in*

<i>dis-tract</i>	<i>gar-gling</i>	<i>ob-scure</i>	<i>oint-ment</i>	<i>dis-play</i>
<i>con-sti-tute</i>	<i>hun-dred</i>	<i>gaunt-let</i>	<i>trust-ful</i>	<i>es-prit</i>
<i>ex-ca-vate</i>	<i>in-twine</i>	<i>month-ly</i>	<i>unc-tion</i>	<i>ex-plain.</i>

The reasons therefor are: (1) that in the formation of words such intervening consonants seem to have been chosen for the first and last, when so many intervene, as are physiologically adapted to connect smoothly with their adjacent vowels; (2) consonants vary so much in their organic formations that some of them combine fluently with one another and others cannot fluently combine.

47. Fourth. The Limit of Audible Distinction. This is reached in the speech sounds at five points, viz.: (1) **In the Vowels**, at the point of distinguishing between two unaccented vowels, as between *lessen—lesson, prophet—profit, cymbal—symbol*, etc.—a difference being made in correct speaking.

48. The Neutral Vowel. With the effort to adjust the mouth parts, in the formation of a particular vowel, gradually lessened to zero, would leave only the crude, unformed sound of the neutral vocal current. This is the common point to which all the vowels tend in their obscuration; but they do not quite reach it. Speech is not an effortless gurgle, and the effort that *should* be made to put the mouth in position for the vowel, *distinguishes* the vowel audibly. It is, therefore, error to indicate the obscure in *different* classes by the *same* symbol, as by an apostrophe in *ev'l*, *eat'n*, *pard'n*, etc. For dictionaries to advocate such a confusion is a perversion of fundamental principles.

49. (2) In the Consonants, at the point of distinguishing between a voiceless sonant and its correlative surd, as the *d* from *t* in the words *packed*—*pact*, *rapped*—*rapt*, *missed*—*mist*, etc.,—a difference being made in correct speaking.

NOTE. The Simplified Spelling Board erroneously prescribes changing the present correct pronunciation and spelling of such *d* to *t* in 712 of its list of 3,300 words. Dictionaries err likewise in indicating such pronunciation. The *d* sound is made with mouth pressure, the *t* with diaphragmatic. They cannot be made otherwise.

50. (3) Between the Vowels and the Consonants, at the point of distinguishing the voiced (vocalized but not vowelized) elements in the sonants and monosounds from the *vowelized* tone of the vowels; as of the *w* and *y* from vowels. For example, the initial part of the diphthongs *ǎ*, *ǒ*, *ǔ*, is taken for a *y* and some dictionaries so indicate the pronunciation, as in *Indian*, *onion*, *usury*, etc. The *y* is clearly different from the vowel as can be seen in *Joliet*—*yet*, *east*—*yeast*, *ewe*—

you, idiom—yum, familiar—yarrow, etc. In the *y*, the fore-tongue is pressed up between the upper teeth so as to touch the gum on the sides; then, as the neutral vocal current attempts to pass out between the tongue and the gum, it is obstructed and converted into a fricative, sibilant element that is clearly different from the vowelized *ǝ* tone. (See post, pages 42 and 66.)

51. (4) **In the Impure Vowel Diphthongs** at the point of distinguishing the class of the short element; and (5) **In the Consonant Diphthongs**, at the point of distinguishing between what constitutes and what does not constitute a diphthong (and a triphthong).

NOTE 1. *Future Growth of Vocabulary.* It must not be inferred, because there are only 43 different speech sounds, 16 vowels and 27 consonants (or 505 different forms—48 vowels, 45 consonants, 56 pure vowel diphthongs, 320 impure, 31 consonant diphthongs and 5 triphthongs), in the human voice, and because every corner of the voice has been ransacked to produce them even to the embracing of all possible blendings and exceptions, that this prevents the indefinite growth of the vocabulary; for when one considers that in some directions the use of the forms has hardly begun to be exploited and considers the principles of permutation it becomes evident that the number of different vowel and consonant combinations available for additional words is beyond comprehension and will be ample for all time to come to meet the requirements for more words in the further development of the arts and sciences.

NOTE 2. *Confusion of Terms.* As the use of the following terms is more or less confused in the dictionaries, the author will distinguish them specifically, viz.:

(First) *Diphthongs and Triphthongs.*—(1) *Vowels.* A vowel diphthong is the successive utterance, at one impulse, of two vowel sounds, in such a manner as to have the effect of a single vowel. (2) *Consonants.* A consonant diphthong is the successive utterance, in connection with a following vowel, of two consonant sounds that combine so closely between themselves and with the vowel as to have the effect, in audible syllabication, of a

single consonant. (3) A *Consonant Triphthong* is the corresponding combination of three consonants.

(Second) *Mixed Sounds*.—(1) *Vowels*. A mixed vowel consists of the fusion of two fundamental vowels, or their correlative short, into one vowel in such a manner that each of the two sound factors loses its separate identity and that the two elements are heard simultaneously throughout the utterance of the sound. There are six of such mixed vowels, the *â*, *û*, *ü* and their correlative short, the *ă*, *ê*, *û*, corresponding to the German umlauts. (2) *Consonants*. A mixed consonant consists of the fusion into one sound of a fundamental sonant, or its correlative surd, with its compatible monosound, in such a manner that each of the two sound factors loses its separate identity and that the two elements are heard simultaneously throughout the utterance of the sound. Such mixed consonants are the *v-f*, *dh-th*, *gh-kh*, *zh-sh*, and *ng-ñ* (?). (3) *Compound Mixed*. In the *j* ($=d+(z-h)$) and the *ch*, as in *chair* ($=t+(s-h)$), the first element is uttered before the other two and the sound is, therefore, compound mixed.

(Third) *Digraphs*. In its broadest sense, a digraph consists of any two letters that represent a single sound; as the *ea* in *break* and the *bt* in *debt*. In a narrower sense, a digraph consists of any two letters that represent a mixed sound, as the German *ue* representing the *ü*, and the *th* representing the *dh* sound in *then*. In a technically accurate sense, a digraph consists of the two letters that represent a mixed sound when such two letters are the letters that severally represent the two sounds, respectively, that were fused into the mixed sound; as, in German, the *ae* and the *oe* representing the *ä* and *ö*, respectively, and the *ph*, *th* and *ng*, representing their respective sounds in *Phil*, *thin*, and *sing*.

(Fourth) *Monographs*. A monograph is to the letters what a mixed sound is to the sounds. To describe it technically accurately: it consists of the single character, or letter, that represents a mixed sound when such character, or letter, is composed of the fusion, into one, of the two letters that, severally, represent the two sounds, respectively, that were fused into such mixed sound. See the Deviation of New Letters in "The Universal Alphabet," for the fusions into monographs (one letter) of the digraphs, (two letters), both print and script,

that now represent the mixed sounds, the *kh*, *sh*, *th*, etc., respectively.

(*Fifth*) A diphthong is a sound: a digraph is a visible character that *represents* a sound. It is, therefore, incorrect to apply the former term to letters or the latter to sounds. Further, a mixed sound is not a diphthong. A diphthong is two sounds uttered successively; a mixed sound is one sound composed of two elements that are uttered simultaneously throughout the continuance of the sound, and which, on coming out of the aperture of the mouth, fuse into a mixed sound similarly as when the bow of a violin is drawn over two strings simultaneously, the two simple sounds fuse into the one, mixed sound. Mixed sounds, although composite, are, thus, simple. It is, therefore, incorrect to call a mixed sound a diphthong.

II

THE ORGANIC FORMATION OF THE SPEECH SOUNDS

52. The organic formation of the speech sounds will be considered under: First, The Organs of Speech; Second, The Mouth Adjustment; Third, The Pressure upon the Breath; Fourth, Voicing and Vowelizing; Fifth, The Position of the Mouth Parts; and then The Organic Formation will be described.

53. First. The Organs of Speech. The organs that *perceive* the sounds are the ears, auditory nerves and brain; and the organs that *produce* the sounds are the mouth, throat, trachea, lungs, chest, and abdomen.

54. (1) Sound. Sound is composed of tone and noise, and the speech sounds, accordingly, divide into tone forms and noise forms—vowels and consonants. The essence of sound is energy; energy propagates in waves. The rapidity of succession of the sound waves causes the musical quality of pitch; the amplitude of the wave gives fullness * and other features in its shape give other qualities and peculiarities to the sound.

NOTE. As the degree of inclination of the secondary axis to the primary axis in a *mineral* crystal (which is simply a *frozen* wave of energy) is characteristic of the *kind* of mineral (iron having a certain degree of inclination, carbon another, etc.), so some feature in the form of the thought wave is indicative of the *kind* of thought—love, hatred, justice, *Wanderlust*, etc. Audible and spatial (i.e., the visible) expressions of thought

* Seiler—The Voice in Speaking.

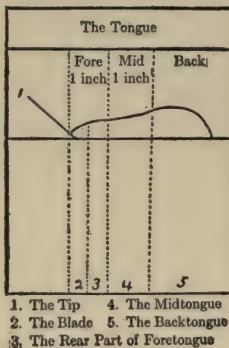
are, therefore, correlated. The principles of the speech sounds penetrate deep into the harmonies of nature.

55. When a speech sound is emitted from one's mouth, the sound waves radiate outwardly from the speaker through the surrounding air, they enter another's ears, they pass up along his *auditory* nerves into the brain, whence the sensation is transferred into the inner world—into the mind. In speaking, the impulse comes from the mind in the inner world out into the brain, thence it passes down along the motor nerves to the organs that produce the sounds and causes such organs to utter them.

56. (2) The Mouth. The mouth consists of (1) the foremouth that has for its roof the hard palate, with its bony subformation, that serves as a sounding board to give resonance to the sound; and (2) the backmouth that begins at the rear end of the hard palate and extends thence backward to the throat and that has a soft, fleshy, nonresonant roof. The foremouth contains the resonant lips, cheeks, teeth, gums, and hard palate—so instrumental in the formation of both the vowels and the consonants,—and whose positions and offices will be given under the formation of the sounds. As little reference will be made to the soft palate, the hard palate, for brevity's sake, will be designated simply as the palate and its parts will be referred to as the forepalate, the midpalate and the rearpalate.

57. (3) The Tongue. In the bottom of the foremouth lies the soft, flexible, nonresonant tongue that can be so adjusted and positioned as to direct the upcoming vocal current or breath to certain resonant places or to certain openings or constrictions in the foremouth whence the vocal current or breath will

deflect, or flow, directly outwardly—not so from the backmouth. For the better understanding of the positions of its parts and of the offices they perform, the tongue will be considered as consisting, as shown in the following diagram, of: (5) the backtongue, which extends backward from the rear end of the hard palate, and of that part which extends thence forward and is about two inches long. Of the last mentioned part, the rear inch will be designated as (4) the midtongue, and the front inch as the foretongue. The foretongue



consists of the rear half-inch and of the front half-inch, of which the former will be designated as (3) the rear part of the foretongue and the latter as (2) the blade of the tongue. The point at the front of the blade will be designated as (1) the tip of the tongue.

58. (4) The Throat contains the larynx, the organ of voice, whose vocal cords act similarly to a reed in a musical instrument and convert the up-coming breath into a crude tone. The *Lungs* are the reservoir that holds the breath (the in-drawn air). The *Trachea* is the windpipe, the tube leading from the throat to the lungs, through which the air flows into and out of the lungs. The *Chest* and the *Abdomen* (by the diaphragm) act like a bellows, to draw (inhale) the air from the outside into the lungs and to force (exhale) the breath from the lungs out through the mouth (and the nose).

59. Second. The Mouth Adjustment. (1) For the Vowels.—(a) **The Vowel Chamber.** Preparatory to

forming a vowel, the sides of the tongue, back of the blade, press against the upper teeth (in the *ā* against the lower) and, at a point about directly under the rear end of the hard palate, the tongue humps up, more or less, towards the roof of the mouth so as to enclose in front of the hump, between the tongue and the hard palate, a resonant cavity—the vowel chamber—differing in shape for each vowel. The higher or lower humping of the tongue causes the breath, as it flows from the rear over the hump of the tongue into the vowel chamber, to impinge at the right place in the vowel chamber.

60. (b) The Resonance Center. Further, there is then formed, by the adjustment, or radial tensioning, of the flexible parts of the foremouth, and at a certain spot in the vowel chamber, differing for each vowel, a resonance center upon which the neutral vocal current coming up from the throat is converged and focalized; and such resonance center by its particular resonance derived from its peculiar anatomic formation, reënforced by the general resonance of the whole vowel chamber, then gives to the neutral vocal current the characteristic sound quality for the particular vowel. Thence the sound deflects directly outwardly.

61. (1st) The Key to the Vowel's Formation. No vowel can be correctly formed, either in speaking or in singing, unless the neutral vocal current is converged upon the vowel's own resonance center. This is because the convergence of the neutral vocal current upon correspondingly the same spot, in each mouth, compels each mouth to assume the same and the correct shape, so that the corresponding vowel gets its peculiar and common sound in every mouth from a resonance center of a common anatomic forma-

tion reënforced by the general resonance of a vowel chamber of a common and a correct shape. The adjustment and radial tensioning of the flexible parts of the foremouth so as to converge and focalize the neutral vocal current upon the vowel's own resonance center is, therefore, the essential factor of *sameness* of adjustment for all mouths; it enables the infant and the adult, the dwarf and the giant, much as their mouths differ in size, to adjust their mouths so alike as to utter, for example, what is audibly perceived as the same *ē* sound in saying *meat*. This is the *key* to the organically correct formation of the vowels. Therefore, all measurements and observations, as to the positions of the mouth parts for the formation of a particular vowel, made when the flexible parts in the foremouth are not so adjusted and tensioned as to form the correct resonance center for that vowel are worse than useless for they are incorrect and misleading.

62. (2d) Location of the Resonance Centers. The location of the resonance center—the essential place of formation—for the eight class vowels, follows:

LOCATION OF RESONANCE CENTERS FOR THE VOWELS

The resonance center: (Located centrally, laterally.)

For the *u* is against the upper lip.

"	ü	"	upper lip—upper foreteeth.
"	ē	"	upper foreteeth.
"	ō	"	upper gum.
"	û	"	upper gum—forepalate.
"	ā	"	forepalate.
"	â	"	forepalate—rearpalate.
"	ä	"	rearpalate.

63. (2) For the Consonants.—(a) The Consonant Chamber. Preparatory to forming a consonant, there is formed (by the closure of the lips, or by their contact with the teeth, or by the contact of the tongue with or its close approach to the lips, upper teeth, gums, or hard palate) a place of constriction in the mouth where the breath, by resistance to its outward passage, is converted into the particular consonant; and at the same time such adjustment and the sides of the tongue pressing against the upper teeth form a cavity in the mouth back of such constriction and above the tongue. This cavity, with its closure or place of constriction at the front, is the consonant chamber.

64. (b) Place of Constriction. The place where the breath impinges—where it is converted into the particular consonant, as shown by the mouth parts employed by each consonant in forming its peculiar constriction,—is as follows:

MOUTH PARTS PRINCIPALLY INVOLVED IN FORMING THE CONSONANTS

The			
m	b	p	involve the Lips.
w	v	f	“ Lips—Foreteeth.
n	d	t	“ Foreteeth—Gum—Foretongue.
l	dh	th	“ Teeth—Gum—Foretongue.
y	j	tsh	“ Gum—Foretongue—Forepalate.
r	z	s	“ Foretongue—Forepalate.
	zh	sh	“ Foretongue — Midpalate.
h	ng	n̄	“ Mid-back Tongue—Rearpalate.
	gh	kh	“ “ “ “
	g	k	“ “ “ “

The foregoing, when compared with the resonance centers for the vowels, shows that each group of consonants

has its corresponding group of vowels with the location of whose resonance center the place of impingement of the breath, for such consonants, corresponds.

65. (c) The Tensioning of the Adjusted Parts. (1st) *In the Vowels* the broad form requires a very firm adjustment of parts, the medium form less so, and the narrow form still less so; in the short vowels the adjustment is firmest for the primarily accented, less so for the secondarily, and still less so for the obscure, or unaccented, but in no case as firm as for either of the long forms. (2d) *In the Consonants* the voiced form requires a firmer adjustment than the voiceless form, and the adjustment for the sonants is firmer than that for the monosounds.

66. Third. The Pressure upon the Breath. (1) *In the Vowels.* In the long vowels the breath is emitted by repressed chest pressure; and in the short vowels by normal chest pressure. (2) *In the Consonants.* The voiced form of the sonants is made by backsuction and mouth pressure, that of the monosounds by repressed and normal chest pressure; the voiceless form of the sonants is made by mouth pressure, that of the monosounds by normal chest pressure, and the surds are made by diaphragmatic pressure. The foregoing is when the sounds are articulated deliberately in isolation; in fluent speaking the manipulation varies more or less from the typical so as to make fluent connections. The *volume* of breath required for each sound, vowel and consonant, is regulated by the action of the abdomen.

NOTE. If one will attentively form the *m*, *p* and *b*, he will notice that their lip positions are just the same and that the difference in the three sounds grows out of the different manipulation of the breath, as above described. The same can be

seen in the *n*, *d* and *t*. Neither of the three sounds can be made with the pressure of either of the others. The difference in pressure differentiates the breath into the three classes of consonants.

67. Fourth. Voicing and Vowelizing. In both the vowels and in the voiced element of the voiced forms of the elastic consonants, the breath, as it comes up from the lungs, is *voiced*, or vocalized, by the vocal cords in the larynx; that is, is converted into the neutral vocal current—a crude, *unformed* tone, like the cooing of a pigeon. Then (1) *In the Vowels*, as the neutral vocal current passes out through the mouth, the mouth, by the adjustment of the flexible parts in the vowel chamber and by their radial tensioning, focalizes the neutral vocal current—the crude, *unformed* tone—upon a certain resonant spot—the resonance center—differing for each class vowel, and which spot, as has been stated, by its particular resonance, derived from its peculiar anatomic formation, re-enforced by the general resonance of the whole vowel chamber, forms, that is *vowelizes*, the crude tone of the neutral vocal current into the *finished* tone that constitutes the particular vowel.

68. (2) *In the Voiced Form of the Consonants*, as the neutral vocal current, the crude, unformed tone, passes out through the mouth, it is not focalized upon a resonance center, but flows into the *closed cavity* of the consonant chamber, or into the *leak* or *opening* at the constriction, so that no resonance, as it were, is imparted to the crude tone. Therefore, in the voiced form of the consonants, the voiced element, instead of being a formed, a *vowelized*, tone, as in the vowels, is, substantially, only the unformed, the *crude*, tone of the neutral vocal current.

69. Fifth. The Position of the Mouth Parts. The approximately correct positions of the lips, of the lower jaw as determined by the distance between the teeth, and of the foretongue, in the correct formation of the speech sounds for the normal, average sized mouth, when the sound is uttered deliberately and in isolation, is about as shown in the following tabulations. In fluent speech the parts change their adjustment in such rapid succession that the mouth has not time enough to put the parts into the typical positions and, therefore, only approximates them. The positions of the mouth parts follow.

NOTE. To determine the opening between the teeth and between the lips, the author made two celluloid gauges (.040 thick) several inches long, one, tapering from a half inch to a point and graded into eighths of an inch, and the other, tapering from one inch to a point and graded into quarters of an inch. He also found useful a piece of such celluloid, six inches long and one-half inch wide, with one end curved somewhat so that, if inserted when the mouth is too near closed for tongue observation, it will lie flat upon or follow the curvature of the tongue. The author also found it advantageous to dip a thread into black ink, dry it, and press it down, across the extended tongue, at one inch and at two inches back from the point so as to mark off the foretongue, midtongue and backtongue. The ink marks stayed for hours, even to next day. The author found that the crest of the hump in the tongue is invariably at about the dividing line between the midtongue and the backtongue, that is, is about under the rear end of the hard palate. This seems necessary in order to enclose the vowel chamber for each vowel under the hard palate as it serves as a "resonance board" and therefore makes the vowel chamber a resonant cavity.

THE POSITIONS OF THE MOUTH PARTS IN THE FORMATION OF THE SOUNDS. (1) OF THE VOWELS

Sounds	Teeth	Lips			PARTS OF FORETONGUE						Breath Impinges upon Upper
		Apart	Aperture	Protrusion	Edge Against Teeth			Humpling†			
					Tip	Fore	Mid	Fore	Mid	Back	
u	5	5	Round	Protruded	Lower	Upper	Upper				Lip
ü	4	5	"	"	"	"	"				Lip-foreteeth
ø	3	5	Broad	Retracted	"	"	"				Foreteeth
ō	6	6	Round	Protruded	"	"	"				Gum
o	7	6	"	"	"	"	"				Gum-forepalate
œ	8	8	Broad	Retracted	"	"	"				Forepalate
ɑ	12*	12*	Round	{ Retracted Protruded	"	"	"				Fore-Rearpalate
ɔ	16*	16*	"	{ Retracted Protruded	"	Lower	Lower				Rearpalate

In the short vowels, the *u*, *ü*, *i*, *ö*, *ē*, *ē*, *ō*, the positions of the mouth parts only approximate those of the long. (See page 47.)

(2) OF THE CONSONANTS

m	3	Closed	Closed	Closed	Normal	Lips {Teeth (Gum)}†	Upper	Upper	†		Lips Foreteeth Gum Forepalate Lips-Foreteeth Gum-Forepalate Rearpalate
n	4	6	Broad	"	"	"	"	"	"		
l	5	6	"	"	"	"	"	"	"		
r	5	6	Round	"	{Normal Protruded	... (Lips) †	"	"	"		
w	4	4	"	"	{Retracted Protruded †	"	"	"		
y	2	6	Broad	"	{Normal †	"	"	"		
h	12*	12*	"	"	{Protruded	Lower	Lower	Lower	Lower		
b	3	Closed	Closed	Closed	{Normal	(Lips)	Upper	Upper	Upper		Lips
v	3	Clear	Broad	Broad	{Normal Retracted	Lower	"	"	"		Lips-Foreteeth
d	3	5	"	"	{Normal	{Gum Teeth †	"	"	"		Foreteeth-Gum
dh	3	5	"	"	{Protruded	Upper	"	"	"		"
j	2	6	"	"	{Normal	(Gum)	"	"	"		Gum-Forepalate
z	1	4	"	"	{Protruded †	"	"	"		Forepalate
zh	1	3	"	"	{Normal †	"	"	"		Midpalate
ng	6	8	"	"	{Protruded	Lower	Upper	"	"		Rearpalate
gh	6	8	"	"	{Normal	"	"	"	"		"
g	6	8	"	"	{Protruded	"	"	"	"		"
	0				{Normal	"	"	"	"		"
p											
t											
th											
t-sh											
s											
sh											
n†											
kh											
k											

The positions of the mouth parts for the surds are approximately like those for the corresponding sonants.—See the organic formation.

* Varies with connecting sounds.

† In relation to Lower Jaw.

‡ See the organic formation *in loco*.

THE ORGANIC FORMATION OF THE SOUNDS

70. This topic will be considered under: First, The Long Vowels; Second, The Short Vowels; Third, The Sonants and the Surds; Fourth, The Monosounds; Fifth, Spurious Sounds, and Sixth, The Descriptive Classification of the Speech Sounds.

First. Of the Long Vowels. 1. *The ē Sound.*—*The Broad Form, as in Meed.* For this simple, broad-lipped vowel, the teeth are about three-sixteenths inch apart; the lips part about five-sixteenths inch and are slightly drawn back as if to show the teeth. The tip of the tongue presses against the inside of the lower foreteeth, the sides of the tongue back of the blade press against the upper teeth, and the tongue is humped up very high,—well from the front. This forms the vowel chamber.

Then as breath comes up from the lungs into the vowel chamber, the larynx vocalizes the breath into the neutral vocal current, and the flexible mouth parts in the vowel chamber so adjust and tension as closely to converge the neutral vocal current centrally forward upon the inside of the upper foreteeth—the resonance center for the *ē*.

Then the resonance center by its particular resonance, reënforced by the general resonance of the whole vowel chamber, *vowelizes* the neutral vocal current into the characteristic *ē* sound, and the sound deflects outwardly.

2. *The ā Sound.*—*The Broad Form, as in Made.* For this simple, broad-lipped vowel, the teeth are about one-half inch apart; the lips part about the same and are slightly drawn back as if to show the teeth. The tip of the tongue presses against the inside of the

lower foreteeth, the sides of the tongue back of the blade press against the upper teeth, and the tongue is humped up very high—well from the front. This forms the vowel chamber.

Then as breath comes up from the lungs into the vowel chamber, the larynx vocalizes the breath into the neutral vocal current, and the flexible mouth parts in the vowel chamber so adjust and tension as closely to converge the neutral vocal current centrally forward upon the forepalate, just back of the upper gum,—the resonance center for the \bar{a} .

Then the resonance center by its particular resonance, reënforced by the general resonance of the whole vowel chamber, *vowelizes* the neutral vocal current into the characteristic \bar{a} sound, and the sound deflects outwardly.

3. *The ä Sound.—The Broad Form, as in Far.* For this simple, mixed-lipped vowel, the teeth are about one inch apart; the lips, the upper slightly drawn back as if to show the teeth and the lower somewhat protruded and dished on the inside, part about the same and make the aperture approximately round. The tip of the tongue presses against the inside of the lower foreteeth and, thence backward, the tongue, its middle part slightly depressed, lies in the bottom of the mouth so that its edge, all around, presses against the inside of the lower teeth. The soft palate is fully raised so as to give both an open throat and an open mouth. This forms the vowel chamber.

Then as breath comes up from the lungs into the vowel chamber, the larynx vocalizes the breath into the neutral vocal current, and the flexible mouth parts in the vowel chamber and in the backmouth so adjust and tension as closely to converge the neutral vocal

current centrally forward upon the hard palate a little forward of its rear edge—the resonance center for the *ä*.

Then the resonance center by its particular resonance, reënforced by the general resonance of the whole vowel chamber, *vowelizes* the neutral vocal current into the characteristic *ä* sound, and the sound deflects outwardly.

4. *The ö Sound.—The Broad Form, as in Mode.* For this simple, round-lipped vowel, the teeth are about three-eighths inch apart; and the lips are protruded and are drawn together over the teeth so as to form a rounded aperture of about the same diameter. The tip of the tongue presses against the inside of the lower foreteeth, the sides of the tongue back of the blade press against the upper teeth, and the tongue, the middle part slightly depressed, is humped up but little—only a trifle in front. This forms the vowel chamber.

Then as breath comes up from the lungs into the vowel chamber, the larynx vocalizes the breath into the neutral vocal current, and the flexible mouth parts in the vowel chamber so adjust and tension as closely to converge the neutral vocal current centrally forward upon the inside of the upper gum—the resonance center for the *ö*.

Then the resonance center by its particular resonance, reënforced by the general resonance of the whole vowel chamber, *vowelizes* the neutral vocal current into the characteristic *ö* sound, and the sound deflects outwardly.

5. *The u Sound.—The Broad Form, as in Rude.* For this simple, round-lipped vowel, the teeth are about five-sixteenths inch apart; and the lips are well

protruded and are drawn together over the teeth so as to form a rounded aperture of about the same diameter. The tip of the tongue presses against the inside of the lower foreteeth, the sides of the tongue, back of the blade, press against the upper teeth, and the tongue, the middle part slightly depressed, is, gradually, fairly humped up. This forms the vowel chamber.

Then as breath comes from the lungs into the vowel chamber, the larynx vocalizes the breath into the neutral vocal current, and the flexible mouth parts in the vowel chamber so adjust and tension as closely to converge the neutral vocal current centrally forward upon the inside of the upper lip—the resonance center for the *u*.

Then the resonance center by its particular resonance, reënforced by the general resonance of the whole vowel chamber, *vowelizes* the neutral vocal current into the characteristic *u* sound, and the sound deflects outwardly.

6. *The â Sound.*—*The Broad Form, as in Fad.* For this mixed ($\ddot{a} + \bar{a} = \hat{a}$), mixed-lipped vowel, the teeth are about three-fourths inch apart; the lips, the upper slightly drawn back as if to show the teeth and the lower somewhat protruded and dished on the inside, part about the same and make the aperture approximately round. The tip of the tongue presses against the inside of the lower foreteeth, the sides of the tongue back of the blade press against the upper teeth, and the tongue, from front to rear, is about in a position midway between that of the *ä* and that of the *ā*. The soft palate is raised. This forms the vowel chamber.

Then as breath comes up from the lungs into the vowel chamber, the larynx vocalizes the breath into

the neutral vocal current, and the flexible mouth parts in the vowel chamber and in the backmouth so adjust and tension as to converge the neutral vocal current centrally forward partly upon the place of the resonance center of the \bar{a} and partly upon the place of the resonance center of the \bar{a} —the double resonance center of the \hat{a} .

Then this double resonance center by its several, particular resonances, reënforced by the general resonance of the whole vowel chamber, so *vowelizes* the two parts of the neutral vocal current into two elements that, as they flow out of the aperture of the mouth, fuse into one and produce the characteristic, mixed \hat{a} sound.

7. *The û Sound.*—*The Broad Form, as in Burn.* For this mixed ($\bar{o} + \bar{a} = \hat{u}$), round-lipped vowel, the teeth are about seven-sixteenths inch apart; the lips are protruded and are drawn together over the teeth so as to form a rounded aperture of about three-eighths inch diameter. The tip of the tongue presses against the inside of the lower foreteeth, the sides of the tongue back of the blade press against the upper teeth, and the foretongue, from front to rear, is about in a position midway between that of the \bar{o} and that of the \bar{a} . This forms the vowel chamber.

Then as breath comes up from the lungs into the vowel chamber, the larynx vocalizes the breath into the neutral vocal current, and the flexible mouth parts in the vowel chamber so adjust and tension as to converge the neutral vocal current centrally forward partly upon the place of the resonance center of the \bar{o} and partly upon the place of the resonance center of the \bar{a} —the double resonance center of the \hat{u} .

Then this double resonance center by its several,

particular resonances, reënforced by the general resonance of the whole vowel chamber, so *vowelizes* the two parts of the neutral vocal current into two elements that, as they flow out of the aperture of the mouth, fuse into one and produce the characteristic, mixed *ü* sound.

8. *The ü Sound.*—*The Broad Form, as in Grün* (German). For this foreign, mixed ($y + \bar{e} = \ddot{u}$), round-lipped vowel, the teeth are about one-fourth inch apart, the lips are protruded and are drawn together over the teeth so as to form a rounded aperture of about five-sixteenths inch diameter. The tip of the tongue presses against the inside of the lower foreteeth, the sides of the tongue back of the blade press against the upper teeth, and the foretongue, from front to rear, is about in a position midway between that of the *y* and that of the \bar{e} . This forms the vowel chamber.

Then as breath comes up from the lungs into the vowel chamber, the larynx vocalizes the breath into the neutral vocal current, and the flexible mouth parts in the vowel chamber so adjust and tension as to converge the neutral vocal current centrally forward partly upon the place of the resonance center of the *y* and partly upon the place of the resonance center of the \bar{e} —the double resonance center of the *ü*.

Then this double resonance center by its several, particular resonances, reënforced by the general resonance of the whole vowel chamber, so *vowelizes* the two parts of the neutral vocal current into two elements that, as they flow out of the aperture of the mouth, fuse into one and produce the characteristic, mixed *ü* sound.

Second. Of the Short Vowels. A short vowel has the same place for its resonance center, and has a

vowel chamber and a lip adjustment of approximately the same shape as its correlative long, and is, therefore, *classically* the same sound. The difference between the two grows out of the following:—

(1) In the short vowels the mouth parts are not adjusted so tensely. This has the effect: (a) of not converging the breath so closely upon the resonance center; (b) of not getting the vowel chamber into the exact shape of the long vowel's; and (c) of not getting the lips into the acute position as for the long. (d) In the *ī*, *ē*, *ō*, *υ*, *ă*, *ē* and *û*, the mouth is a little more open and in the *ǒ*, is a little less open; and (e) the humping of the tongue is not generally so high but in the *ǒ* the tongue lies a little higher—is a little looser.

(2) The breath is expelled with greater pressure, normal chest pressure as against repressed chest pressure, so that the volume of breath consumed in forming a short vowel is greater than that of its correlative long.

From the foregoing it follows that the sound of a short vowel, as compared with its correlative long, is more aspirated,—is not so pure in tone,—and is not, naturally, so well adapted to be prolonged. Although classically alike, the short sounds differ from the long both in quality and in quantity—more and more as the accent diminishes. (See ante, page 27, par. 48—The Neutral Vowel.)

As a short vowel is, thus, *classically* the same sound as its correlative long, and as the two of each couplet vary by a common difference in the organic formation, as above described, it is not necessary to give a detailed description of the formation of each short vowel. When necessary, the organic formation of the correlative long can be referred to and the difference between its formation and that of the short observed, point by

point, on attentively articulating the two sounds in contrast.

Third. Of the Sonants and the Surds. 1. The *b* and *p* Sounds.—(1) *The b Sound—The Voiced Form, as in Lobe.* For this simple sonant, the teeth are about three-sixteenths inch apart; the lips are in a medial position, forward and backward, and are closed. The tip of the tongue is raised and projected to between the teeth, without touching them but together with the sides of the blade lightly touching the lips, and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, firmly closed at its front.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx; the adjustment is tensioned, backsuction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *b*.

Then backsuction ceases, the tensioning is let go, the lip-contact is broken and, at the same time, the mouth pressure upon the unvocalized breath confined in the consonant chamber causes such compressed breath to rush out explosively between the opened lips. The noises caused by the breaking of the lip-contact and by such explosion of the breath compose the other, the voiceless, part of the voiced form of the *b*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The p Sound, as in Pet.* This correlative, simple surd is made approximately like the voiceless form of the b, but unvoalized breath direct from the lungs is exploded by the more forcible, diaphragmatic pressure.

Compare lobe—bet—pet.

2. *The d and t Sounds.*—(1) *The d Sound—The Voiced Form, as in Feed.* For this simple sonant, the teeth are about three-sixteenths inch apart; the lips part about five-sixteenths inch, they are in a medial position, forward and backward, and are opened broadly. The foretongue is curled up so that the tip of the tongue, touching up against the lower edge of the inside of the upper gum, presses firmly against the inside of the upper foreteeth, and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, firmly closed at its front.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is tensioned, backsuction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *d*.

Then backsuction ceases, the tensioning is let go, the tongue-teeth contact is broken and, at the same time, the mouth pressure upon the unvoalized breath confined in the consonant chamber causes such compressed breath to rush out explosively between the tip of the tongue and the inside of the upper foreteeth. The noises caused by the breaking of the tongue-

teeth contact and by such explosion of the breath compose the other, the voiceless, part of the voiced form of the *d*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The t Sound, as in Ten*. This correlative, simple surd is made approximately like the voiceless form of the *d*, but unvocalized breath direct from the lungs is exploded by the more forcible, diaphragmatic pressure.

Compare Feed—din—ten.

3. *The g and k Sounds*.—(1) *The g Sound—The Voiced Form, as in Dog*. For this simple sonant the teeth are about three-eighths inch apart; the lips part about one-half inch, they are in a medial position, forward and backward, and are opened broadly. The tip of the tongue presses against the inside of the lower foreteeth; thence backward, the sides of the tongue press against the upper teeth; and, at about the dividing line between the midtongue and the backtongue, the tongue humps up and presses firmly against the hard palate so as to form, back of the contact, the consonant chamber, firmly closed at its front.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx; the adjustment is tensioned, backsuction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *g*.

Then backsuction ceases, the tensioning is let go, the

tongue-palate contact is broken and, at the same time, the backmouth pressure upon the unvoiced breath confined in the consonant chamber causes such compressed breath to rush out explosively between the hump of the tongue and the hard palate. The noises caused by the breaking of the tongue-palate contact and by such explosion of the breath compose the other, the voiceless, part of the voiced form of the *g*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The k Sound, as in Kit.* This correlative, simple surd is made approximately like the voiceless form of the *g*, but unvoiced breath direct from the lungs is exploded by the more forcible, diaphragmatic pressure.

Compare dog—got—kit.

4. *The ng and ñ Sounds.*—(1) *The ng Sound—The Voiced Form, as in Long.* For this mixed ($n+g=ng$) sonant, the teeth are about three-eighths inch apart; the lips part about one-half inch, they are in a medial position, forward and backward, and are opened broadly. The tip of the tongue touches the inside of the lower foreteeth; the sides of the foretongue press against the upper teeth; the sides of the midtongue press against the insides of the upper gum; and, at about the dividing line between the midtongue and the backtongue, the tongue humps up and presses against the hard palate so as to form, back of the contact, the consonant chamber, firmly closed at its front.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is tensioned, back-suction draws the air back out of the consonant

chamber, as if to produce a vacuum in it, and closes the passage between the mouth and the lungs—some of the sound going up into the nasal cavity; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced, nasal sound that constitutes the initial part of the voiced form of the *ng*.

Then backsuction ceases, the tensioning is let go, the tongue-palate (and gum) contact is broken and, at the same time, the backmouth pressure upon the unvocalized breath confined in the consonant chamber causes such compressed breath to rush out somewhat explosively between the hump of the tongue and the hard palate. The noises caused by the breaking of the tongue-palate (and gum) contact and by such explosion of the breath composes the other, the voiceless, part of the voiced form of the *ng*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The \bar{n} Sound, as in Monkey*. This correlative, imperfect, mixed ($n+?= \bar{n}$) surd is made partly like the voiceless form of the *ng*, but the tongue does not rise high enough, at the hump, to touch either the hard palate, the gums, or the teeth as firmly as in the *ng*, because in the *ng* such features are caused by the *g* factor, and in the \bar{n} the corresponding factor, the *k*, is wanting. (See page 16, note.) Therefore, in the \bar{n} , unvocalized breath direct from the lungs is explosively emitted only by chest pressure.

Compare long—sing—mon-key. (Also compare *ban—ban-ker—bang*.)

5. *The dh and th Sounds*.—(1) *The dh—The Voiced Form, as in Lathe*. For this mixed ($d+h=dh$) sonant, the teeth are about three-sixteenths inch apart; the

lips part about five-sixteenths inch, the upper is in a medial position, forward and backward, the lower is somewhat protruded, and they are opened broadly. The tip of the tongue projects between the foreteeth, so that the under side of the blade incidentally touches the lower foreteeth, and the upper side of the blade touches the upper foreteeth but so as to leave a little leak between them and the tongue, and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, closed at its front except the little leak between the tip of the tongue and the upper foreteeth.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is tensioned, backsuction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and loosely closes the leak between the tip of the tongue and the upper teeth and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced sound, that constitutes the initial part of the voiced form of the *dh*.

Then backsuction ceases, the tensioning is let go, a little of the unvocalized breath confined in the fore-mouth escapes fricatively through the leak between the tip of the tongue and the upper foreteeth, the tongue-teeth contact is broken and, at the same time, the mouth pressure upon the breath confined in the consonant chamber causes such compressed breath to rush out somewhat explosively between the tip of the tongue and the upper foreteeth. The fricative noise and the noises caused by the breaking of the tongue-teeth contact and by such explosive emission

of the breath compose the other, the voiceless, part of the voiced form of the *dh*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The th Sound, as in Thin*. This correlative, mixed ($t+h=th$) surd is made approximately like the voiceless form of the *dh*, but unvoalized breath direct from the lungs is explosively emitted by the more forcible, diaphragmatic pressure.

Compare lathe—then—thin.

6. *The v and f Sounds*.—(1) *The v Sound—The Voiced Form, as in Eve*. For this mixed ($b+h=v$) sonant, the teeth, the lower drawn back, are about three-sixteenths inch apart; the lips part enough to clear, the upper is in a medial position, forward and backward, and the lower is so drawn in and over the lower teeth that with its outside it leakily presses against the bottom of the upper foreteeth. The tip of the tongue is raised enough to touch the lower lip, the under side of the blade presses against the inside of the lower foreteeth and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, closed at its front except the little leak between the lower lip and the upper foreteeth.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is tensioned, backsuction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and loosely closes the little leak between the lower lip and the upper foreteeth and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the

vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *v*.

Then backsuction ceases, the tensioning is let go, a little of the unvocalized breath confined in the fore-mouth escapes fricatively through the leak between the lower lip and the bottom of the upper foreteeth, such lip-teeth contact is broken and, at the same time, the mouth pressure upon the breath confined in the consonant chamber causes such compressed breath to rush out somewhat explosively between the lower lip and the bottom of the upper foreteeth. The fricative noise and the noises caused by the breaking of the lip-teeth contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *v*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The f Sound, as in Fat*. This correlative, mixed ($p+h=f$) surd is made approximately like the voiceless form of the *v*, but unvocalized breath direct from the lungs is explosively emitted by the more forcible diaphragmatic pressure.

Compare eve—vet—fat.

7. *The gh and kh Sounds*.—(1) *The gh Sound—The Voiced Form, as in Tag (German)*. For this foreign, mixed ($g+h=gh$) sonant, the teeth are about three-eighths inch apart; the lips part about one-half inch, the upper is in a medial position, forward and backward, and the lower is somewhat protruded, and they are opened broadly. The tip of the tongue presses against the inside of the lower foreteeth, the sides of the tongue press against the upper teeth, and, at about the dividing line between the midtongue and

the backtongue the tongue humps up and leakily presses against the hard palate so as to form, back of the contact, a consonant chamber, closed at its front except the little leak between the hump of the tongue and the hard palate.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is tensioned, backsuction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and loosely closes the little leak between the hump of the tongue and the hard palate and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *gh*.

Then backsuction ceases, the tensioning is let go, a little of the unvoalized breath confined in the backmouth escapes fricatively through the leak between the hump of the tongue and the hard palate, such tongue-palate contact is broken and, at the same time, the backmouth pressure upon the breath confined in the consonant chamber causes such compressed breath to rush out somewhat explosively between the hump of the tongue and the hard palate. The fricative noise and the noises caused by the breaking of the tongue-palate contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *gh*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The kh Sound, as in Ach* (German). This correlative, mixed ($k+h=kh$), foreign surd is made

approximately like the voiceless form of the *gh*, but unvoalized breath direct from the lungs is explosively emitted by the more forcible, diaphragmatic pressure.

Compare Tag—legen—ach (German).

8. *The zh and sh Sounds.*—(1) *The zh Sound—The Voiced Form, as in Rouge.* For this mixed ($z+h=zh$) sonant, the teeth are about one-sixteenth inch apart; the lips part about three-sixteenths inch, the upper is in a medial position, forward and backward, the lower is somewhat protruded, and they are opened broadly. The foretongue is curled up so that the tip, slightly bent down, is just back of and clears the center of the inside of the upper gum, and the blade of the tongue is under and leakily clears the forepalate; the sides of the rear part of the foretongue press against the insides of the upper gum and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, closed at the front except the leak between the blade of the tongue and the forepalate.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx; the adjustment is tensioned, back-suction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and loosely closes the leak between the blade of the tongue and the forepalate and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *zh*.

Then backsuction ceases, the tensioning is let go, a little of the unvoalized breath confined in the con-

sonant chamber escapes fricatively through the leak between the blade of the tongue and the forepalate; the tongue-gum contact is broken and, at the same time, the mouth pressure upon the breath confined in the consonant chamber causes such compressed breath to rush out somewhat explosively between the blade of the tongue and the forepalate. The fricative noise and the noises caused by the breaking of the tongue-gum contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *zh*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The sh Sound, as in Shun.* This correlative, mixed ($s+h=sh$) surd is made approximately like the voiceless form of the *zh*, but unvocalized breath direct from the lungs is explosively emitted by the more forcible, diaphragmatic pressure.

Compare rouge—azure—shun.

9. *The z and s Sounds.*—(1) *The z Sound—The Voiced Form, as in Haze.* For this simple sonant, the teeth are about one-sixteenth inch apart; the lips part about one-fourth inch, they are in a medial position, forward and backward, and are opened broadly. The foretongue is curled up so that the tip, slightly notched, is just back of and leakily clears the center of the inside of the upper gum; the sides of the blade of the tongue press against the insides of the gum and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, closed at the front except the leak between the tip of the tongue and the inside of the upper gum.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced,

by the larynx: the adjustment is tensioned, back-suction draws the air back out of the consonant chamber, as if to produce a vacuum in it, and loosely closes the leak between the tip of the tongue and the gum and closes the passage between the mouth and the lungs; this stops the upward flow of breath and the voicing, and so represses and muffles the vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *z*.

Then backsuction ceases, the tensioning is let go, a little of the unvoalized breath confined in the consonant chamber escapes fricatively through the leak between the tip of the tongue and the gum, the tongue-gum contact is broken and, at the same time, the mouth pressure upon the breath confined in the consonant chamber causes such repressed breath to rush out somewhat explosively between the tip of the tongue and the gum. The fricative noise, and the noises caused by the breaking of the tongue-gum contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *z*.

The Voiceless Form consists of only the terminal, the voiceless, part of the voiced form.

(2) *The s Sound, as in Sit*. This correlative, simple surd is made approximately like the voiceless form of the *z*, but unvoalized breath direct from the lungs is explosively emitted by the more forcible, diaphragmatic pressure.

Compare haze—zip—sit.

10. *The j and t-sh (=ch) Sounds.*—(1) *The j Sound—The Voiced Form, as in Age*. This compound-mixed ($d+(z+h)=j$) sonant is composed of the voiced form of the *d* and of the voiceless form of the *zh*, but the two factors do not fuse; that is, they are not uttered

simultaneously but successively and their connecting ends are slightly modified so as to connect smoothly. The sound is, therefore, compound-mixed.

The Voiceless Form is composed of the voiceless form of the *d* and of the voiceless form of the *zh*, uttered successively, and slightly modified so as to connect smoothly.

(2) *The t-sh (=ch) Sound, as in Check.* This correlative, compound-mixed ($t + (s + h) = tsh$) surd is composed of the *t* and of the *sh*, not uttered simultaneously but successively, and the two sounds are slightly modified so as to connect smoothly. Like the *j*, the *t-sh* is compound-mixed.

Compare age—jack—check.

Fourth. Of the Monosounds. 1. The *m* Sound.—

(1) *The Voiced Form, as in Boom.* For this monosound, the teeth are about three-sixteenths inch apart; the lips are in a medial position, forward and backward, and are closed. The tip of the tongue is raised and projected to between the teeth, without touching them but together with the sides of the blade lightly touching the lips, and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, firmly closed at its front.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is somewhat tensioned, the vocal current tries to flow out between the closed lips and is checked—some of the sound going up into the nasal cavity; this so represses and muffles the vocal current as to convert it into the obscure, voiced, nasal sound that constitutes the initial part of the voiced form of the *m*.

Then the checking and the voicing cease, the ten-

sioning is let go, the lip contact is broken and, at the same time, the chest pressure upon the unvoiced breath confined in the consonant chamber causes such repressed breath to rush out slightly explosively between the opened lips. The noises caused by the breaking of the lip contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *m*.

(2) *The Voiceless Form* consists of only the terminal, the voiceless, part of the voiced form.

Compare boom—met.

2. *The n Sound*.—(1) *The Voiced Form, as in Dean*. For this monosound, the teeth are about one-fourth inch apart; the lips part about three-eighths inch, they are in a medial position, forward and backward, and are opened broadly. The foretongue is curled up so that the tip of the tongue, touching up against the lower edge of the inside of the upper gum, presses firmly against the inside of the upper foreteeth and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, firmly closed at its front.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is somewhat tensioned, the vocal current tries to flow out between the tip of the tongue and the teeth and is checked—some of the sound going up into the nasal cavity; this so represses and muffles the vocal current as to convert it into the obscure, voiced, nasal sound that constitutes the initial part of the voiced form of the *n*.

Then the checking and the voicing cease, the tensioning is let go, the tongue-teeth contact is broken and, at the same time, the chest pressure upon the un-

vocalized breath confined in the consonant chamber causes such repressed breath to rush out slightly explosively between the tip of the tongue and the inside of the upper foreteeth. The noises caused by the breaking of the tongue-teeth contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *n*.

(2) *The Voiceless Form* consists of only the terminal, the voiceless, part of the voiced form.

Compare dean—net.

3. *The l Sound.*—(1) *The Voiced Form, as in Vail.* For this monosound, the teeth are about five-sixteenths inch apart; the lips part a little more, they are in a medial position, forward and backward, and are opened broadly. The foretongue is curled up so that the tip presses centrally forward against the middle of the inside of the upper gum; the lateral edges of the blade press against the insides of the upper gum; the sides of the rear part of the foretongue press against the inside of the upper teeth; and the lateral edges of the midtongue are free. This forms the consonant chamber, closed at its front but open over the lateral edges of the midtongue.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is somewhat tensioned, the vocal current tries to flow out between the tip of the tongue and the inside of the upper gum but is stopped there and passes out over the sides of the midtongue; this so checks and muffles the vocal current as to convert it into the obscure, voiced, liquid sound that constitutes the initial part of the voiced form of the *l*.

Then the checking and the voicing cease, the ten-

sioning is let go, the tongue-gum contact is broken and, at the same time, the chest pressure upon the unvoiced breath confined in the consonant chamber causes such repressed breath to rush out slightly explosively between the tip of the tongue and the inside of the upper gum. The noises caused by the breaking of the tongue-gum contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *l*.

(2) *The Voiceless Form* consists of only the terminal, the voiceless, part of the voiced form.

Compare *vail*—*let*. (Also observe the voiceless *l*'s in *clip*, *flip*, *flop*.)

4. *The r Sound*.—(1) *The Voiced Form*, as in *Burr*. For this monosound, the teeth are about five-sixteenths inch apart; the lips part a little more, the upper is in a medial position, forward and backward, and is broad, and the lower is slightly protruded and rounded, and the aperture is approximately round. The foretongue is curled up so that the tip is just back of and clears the center of the inside of the upper gum; the blade of the tongue, with its edges free, is under and clears the forepalate and, thence backward, the sides of the tongue press against the inside of the upper teeth. This forms the consonant chamber, thinly open over the blade of the tongue.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized by the larynx: the adjustment is somewhat tensioned, the vocal current flows out through the shallow opening between the blade of the tongue and the forepalate and the blade of the tongue vibrates very minutely; this so checks and muffles the vocal current as to convert it into the obscure, voiced, vibratory, liquid

sound that constitutes the initial part of the voiced form of the *r*.

Then the checking and the voicing cease, the tensioning is let go, the tongue-teeth contact is broken and, at the same time, the chest pressure upon the unvoiced breath confined in the consonant chamber causes such repressed breath to rush out slightly explosively between the blade of the tongue and the forepalate. The noises caused by the breaking of the tongue-teeth contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *r*.

(2) *The Voiceless Form, as in Timber*, consists of only the terminal, the voiceless, part of the voiced form.

The foregoing constitute the untrilled, or tremulous, *r*.

(3) *The Trilled, or Flapped, r, as in Rot*. This dual voiceless form of the *r* differs from the untrilled, or tremulous, form in that in the trilled, or flapped, *r* the adjustment of the tongue and other mouth parts is looser, and in that as the breath passes out over the blade of the tongue, instead of the blade vibrating as in the untrilled, or tremulous, *r*, the tip of the tongue flaps several times in very rapid succession against the forepalate.

The untrilled, or tremulous, *r* occurs correctly only after vowels and the trilled, or flapped, *r* occurs correctly only before vowels.

Compare *burr—timber—rot*.

5. *The w Sound*.—(1) *The Voiced Form, as in Beew*. For this monosound, the teeth are about one-fourth inch apart; the lips part about the same, they are protruded and are opened roundly. The tip of the tongue is raised and projected to between the teeth, without

touching them or the lips, the sides of the blade of the tongue touch the lips lightly and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, somewhat open at its front.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized by the larynx: the adjustment is somewhat tensioned, and as the vocal current tries to flow out between the tip of the tongue and the upper teeth and lip it is checked; this so represses and muffles the vocal current as to convert it into the obscure, voiced, liquid sound that constitutes the initial part of the voiced form of the *w*.

Then the checking and the voicing cease, the constriction and tensioning at the front of the mouth are let go, and, at the same time, the chest pressure upon the unvocalized breath confined in the consonant chamber causes such repressed breath to rush out slightly explosively between the tip of the tongue and the opened lips. The noises caused by the letting go of the constriction and tensioning at the front of the mouth and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *w*.

(2) *The Voiceless Form* consists of only the terminal, the voiceless, part of the voiced form.

Compare beew—wet.

6. *The y Sound*.—(1) *The Voiced Form, as in Beey*. For this monosound, the teeth are about one-eighth inch apart; the lips, the upper drawn back and the lower slightly protruded, part about three-eighths inch, and are opened broadly. The foretongue is raised so that the tip, slightly notched, is just back

of and clears the front center of the inside of the upper gum; that the sides of the blade press upward against the sides of the upper gum; that the rear edges of the front part of the foretongue press against the inside of the upper teeth; and, thence backward, the sides of the tongue press against the upper teeth. This forms the consonant chamber, open over the blade of the tongue.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx: the adjustment is somewhat tensioned, and as the vocal current flows out over the blade of the tongue the constriction checks it; this so represses and muffles the vocal current as to convert it into the obscure, voiced, fricative sound that constitutes the initial part of the voiced form of the *y*.

Then the checking and the voicing cease, the tensioning is let go, the tongue-gum contact is broken and, at the same time, the chest pressure upon the unvocalized breath confined in the consonant chamber causes such repressed breath to rush out slightly explosively between the blade of the tongue and the upper gum. The noises caused by the breaking of the tongue-gum contact and by such explosive emission of the breath compose the other, the voiceless, part of the voiced form of the *y*.

(2) *The Voiceless Form* consists of only the terminal, the voiceless, part of the voiced form.

Compare beey—yet.

7. *The h Sound.*—(1) *The Voiced Form, as in Beeh.* For this monosound the teeth are about three-fourths inch apart; the lips, the upper in a medial position, forward and backward, and the lower protruded, part about the same and are opened broadly. The tongue

lies in the bottom of the mouth and its edge, all around, presses against the lower teeth. The velum (the soft palate) is raised. This forms the open consonant chamber.

Then as breath comes up from the lungs into the consonant chamber, the breath is vocalized, or voiced, by the larynx; the parts in the rear part of the mouth so adjust and tension as to form a slight, circular constriction in the oral cavity, a little in front of the rear end of the hard palate, where the vocal current impinges on its passing out; this so represses and muffles the vocal current as to convert it into the obscure, voiced sound that constitutes the initial part of the voiced form of the *h*.

Then the voicing and the so impinging of the vocal current cease, the constriction and tensioning are let go, and the chest pressure emits the breath, unvocalized. The noises caused by the letting go of such constriction and by the free emission of the unvocalized breath through the open throat and open mouth compose the other, the voiceless, part of the voiced form of the *h*.

(2) *The Voiceless Form* differs from the voiced form in that a full volume of unvocalized breath, direct from the lungs, is emitted by unimpeded chest pressure through the open throat and open mouth as the purely aspirated sound characteristic of the voiceless form of the *h*.

Compare beeh—hot.

71. Fifth. Spurious Sounds. As has been stated in the preface, A. J. Ellis, the great English phonetician, in his paleotypic alphabet, gives 273 different sounds in actual use in English pronunciation. How many different sounds such an analysis would make

of all the sounds in all of the world's 3424 languages,* it is hard to conjecture. Such a wide difference from the result of the author's investigation grows out of the facts that the sounds have not heretofore been correctly analyzed into all their series, classes, kinds and forms to the limit of audible distinction, and that their physiologically correct pronunciations have not been established. That eminent author, therefore, took usage, which varies with time and place, as the standard of pronunciation, instead of the organically correctly formed sounds, and otherwise so mistook the sounds that he included in his list, as *different sounds*, (1) *different forms* of the same sound; (2) *incorrectly formed sounds*; and (3) *sounds whose terminals are, unavoidably, slightly modified when connecting with sounds of a different mouth formation.* The last two need consideration.

72. (1) Incorrectly Formed Sounds.—(a) Of the Vowels. Every vowel has its peculiar resonance center and its peculiar lip adjustment. When, therefore, a vowel is formed either at an incorrect resonance center or with an incorrect lip adjustment, the sound will not be correct; that is, the quality of the sound will vary, more or less, from the typically correct sound. The neutral vocal current is very sensitive and these deviations from the correct formation affect the sound in the following three ways, viz.:—

73. First. Each vowel receives an essential element of its characteristic tone quality from the resonance center because of its peculiar, anatomic formation. When, therefore, for example, in the \bar{e} , whose resonance center is upon the inside of the upper foreteeth, the

* World Almanac.

vocal current is deflected from the inside of the upper lip; or when in the \bar{o} , whose resonance center is upon the upper gum, the vocal current is deflected from the back part of the hard palate; or when in the u , whose resonance center is upon the inside of the upper lip, the vocal current is deflected from the inside of the upper foreteeth;—it is evident that the quality of the sound in neither case can be quite correct, for the anatomic formations of the upper lip, of the teeth, and of the hard palate are so different that each imparts a noticeably different resonance to the vocal current deflecting from it.

74. *Second.* Nothing but the correct internal adjustment of the foremouth for the resonance center of the particular vowel will give to the vowel chamber the correct shape for that vowel. A vowel chamber is a complexity of cavities: when, therefore, the vowel chamber is of the right shape, the noise resonances from the different recesses, like the undertones and overtones in a beautifully balanced voice, are correct and blend agreeably; and when the vowel chamber is not of the right shape, such noise resonances are not correct and they blend harshly.

75. *Third.* As the lip adjustment—the different tensioning, the protrusion and retraction, the broadening and rounding, and the form and size of the aperture—also affect the outgoing sound, and as each vowel requires for its correct utterance its peculiar lip adjustment, every deviation therefrom will, more or less, modify the sound.

NOTE. Let one form, for example, the \bar{e} at each of the five different resonance centers and by directing his attention carefully to the quality of the sound he can perceive the difference

in the sounds, and he will discover that the \bar{e} can only be correctly formed with the resonance center upon the inside of the upper foreteeth. Likewise with each of the other class vowels. It may take a little practice to make the observation. And by reversing the broadening and the rounding of the lips in uttering the \bar{e} and \bar{u} and the \bar{a} and \bar{o} sounds, the different lip effect can also be observed.

NOTE 1. *The English Broad α (= δ) Perversion.* Is the English broad α (δ) sound (Webster's markings), as indicated by the dictionaries for *law—all—war*, (1) a form of the \bar{a} , as indicated for *ah—calm—far*, is it (2) an additional class vowel, or is it (3) a perversion? Let us see: (1) As the α (δ) modifies into long and short and inflects in all the forms, the α (δ) is, therefore, not a form of the \bar{a} but assumes the position of a class vowel. (2) But as in the foremouth, where the organic formation changes much at close intervals, every available spot has been appropriated, as a vowel resonance center, for the \bar{e} , \bar{a} , $\bar{\alpha}$, \bar{o} , \bar{u} — \bar{a} , \bar{u} , \bar{u} ; as nature has so fixed the resonance centers that these eight class vowels vary by about equally great differences; and as there is not difference enough in the sounds to insert another class vowel between any two;—there is, therefore, no place in the foremouth where another class vowel can be formed, nor room between the sounds, as different sounds, where it can be inserted. To interpose another class vowel breaks down nature's distinction and causes confusion in the expression of thought. (3) The α (δ) is, therefore, a perversion, a guttural as the dictionaries properly call it, formed in the backmouth. But every cultivated speaker and singer knows the importance of the correct forward direction of the vocal current, and that, when sounds are formed too far back in the mouth, the vocal current, instead of coming directly forward, as it does in a sound formed at the correct place, forms an eddy in the back of the mouth, that impairs the reach of the sound, that imparts a nasal twang to it, and that is injurious to the voice. Nature intends us to speak with our mouths not down in our stomachs. The lower lip must not be retracted and raised so as to let the reflection of the sound from the rear end of the hard palate strike the lower lip and be turned back and form an eddy back in the mouth; the lower lip must be protruded and lowered so as to let such reflected sound come out.

NOTE 2. For more than fifty years, English dictionaries have indicated as an English speech sound a guttural q (δ) that is not recognized in German, Italian and other languages. This has had the following bad effects: (1) it has imparted to English in general, and to educated English in particular, a nasal blemish; (2) it has largely deprived English of the prettiest vowel sound by substituting for many of its \bar{a} 's an unesthetic, guttural perversion that has neither reach nor resonance; (3) it has introduced in English a sound that is very injurious to the voice; and (4) it has caused a great confusion in the understanding and in the pronunciation of this class of sounds.

76. (b) Of the Consonants. The consonants are strong breath, or noise, forms and are not, generally, as easily affected as the vowels. Their modifications grow principally out of being affected when combining with other sounds and this will be considered in that connection; two other features will be noticed here. (1) As the voiced form of the sonants and monosounds does not occur (at least not in English), when such elastic consonants attach precedingly to a vowel and yet many erroneously voice such consonants in such positions, particularly the monosounds m , n , w and y , some of such consonants have been construed as also being vowels or semivowels. (2) As the difference in the formation between the \bar{e} and the y is not generally understood, the ĩ sound (the short of \bar{e}) in the diphthongs $\text{ĩ}\bar{a}$, $\text{ĩ}\bar{o}$, etc., has been mistaken for the y in such words as *Indian*, *onion*, etc. (See ante, page 27 par. 50.)

77. (2) Effect of Differently Formed Connecting Sounds. To give man the widest possible range for the audible expression of his thoughts, nature has appropriated (1) every possible different place in the mouth at which and (2) every possible different mouth adjustment by which available sounds can be pro-

duced. Hence both vowels and consonants are formed at places in the mouth varying from the lips to the rear end of the hard palate and with the adjustment of as widely different mouth parts. Therefore, when sounds of widely different organic formations connect, their connecting ends are more or less modified so as to allow them to make physiologically easy unions. The place of formation and the mouth parts employed are intimately connected but the effect will be easier understood if considered separately. Therefore the vowels, as to the location of their resonance centers, and the consonants, as to the place of impingement of the breath as shown by the mouth parts principally involved to produce the constriction, will now be paralleled.

(a) **THE VOWELS AND CONSONANTS PARALLELED ACCORDING TO THE RESONANCE CENTERS OF THE VOWELS AND THE MOUTH PARTS PRINCIPALLY INVOLVED IN FORMING THE CONSONANTS**

CONSONANTS				VOWELS	
Mouth Parts Involved				Resonance Center	
				Position	
	Lips	m b p		1	ʊ ʊ Lip
	Lips—Teeth	w v f		2	ü ü Lip—Foreteeth.
	Teeth—Gum—Tongue	n d t		3	ē ɪ Foreteeth.
	Teeth—Gum—Tongue	l dh th		4	ō ó Gum.
	Gum—Tongue—Forepalate	y j tsh		5	û ë Gum—Forepalate.
	Tongue—Forepalate	r z s		6	ā ě Forepalate.
	Tongue—Midpalate	zh sh		7	â ă Forepalate—Rearpalate.
	Midtongue—Rearpalate	h ng ñ		8*	ä ö Rearpalate.
	Midtongue—Rearpalate	gh kh		9*	
	Midtongue—Rearpalate	g k		10*	

* 8, 9, and 10 are close together.

78. (b) Shiftability of the Sounds. If one will insert between two of the consonants in the first position the long vowel in the first position, between two of the consonants in the second position the long vowel in the second position, between two of the consonants in the third position the long vowel in the third position, and so on down to the eighth position, articulating the sounds attentively, slowly and correctly, he will notice that, in each case, the sounds combine smoothly, because the speaking, as to the place of forming the sounds, is done, as it were, on a horizontal level. Then if one will insert, say, between the *m* and *b*, in the first position, the long vowel in the first position, between the same consonants the long vowel in the second position, between the same consonants the long vowel in the third position, and so on down to the eighth position, articulating the sounds equally attentively, slowly and correctly, he will notice that instead of speaking as before on a horizontal level, as it were, he is speaking similarly to a singer's practicing *do—do—do*, *do—si—do*, *do—la—do*, *do—sol—do*, etc., down to the octave.

79. Back Sounds More Shiftable. As the sounds are mostly forwardly formed sounds, to connect fluently with them, the back sounds are, therefore, more shiftable. When, therefore, for example, the *ä* intervenes between two front consonants, as in *mob*, the *ä* is formed farther forward than when the sound intervenes between two back consonants, as in *cog* (*c=k*), and that changes the sound of the *ä* somewhat; but not enough to make a different vowel of it or a different form of the vowel. Likewise when a back consonant, as for example the German *kh*, follows a front vowel, as in *ich*, the *kh* (*ch=kh*) is formed farther forward

than when such consonant follows a back vowel, as in *ach*; but that, also, does not make a different consonant of it or a different form of the consonant.

80. (3) Effect of Different Mouth Parts Employed.

Then when one considers the difference in the mouth parts employed, and their different adjustment, in the formation of different sounds, the effect of connecting sounds will be further in evidence. For example: in careless speaking, the *l*, in the word *ale*, converts the vanish of the *ā* into *ò*, (the appearance of the letter *i* (*ĩ*) in *ail* converts the vanish of the *ā* into *ĩ*), and the premature closing of the mouth in *show*, *no*, *blow*, etc., and the *m* in *home*, *Rome*, *dome*, etc., converts the vanish of the *ō* into *u*.

81. The number of trifling modifications that an acute ear can be educated to detect runs up into the hundreds. As such terminal modifications, however, can be largely avoided by correct speaking, and as where they cannot be avoided they are alike in all speakers, in so far as they could be classified, such modifications are negligible. In some cases the physiological tendency of a strong sound has been so potent as to have completely changed a weaker sound connecting with it to a sound of another class, as in *nature*, *shut*, etc. Such changes have, however, been recognized. Speech is complicated and profound.

82. Sixth. Descriptive Classification of the Speech Sounds. The foregoing analysis shows that there are, altogether, 93 different forms of the 43 speech sounds in the human voice—48 of the vowels and 45 of the consonants, as shown in the following tabulations:

(1) DESCRIPTIVE CLASSIFICATION OF THE SIMPLE VOWEL SOUNDS

Exemplification		Nature	ORGANIC FORMATION		Kind	Form
			Lip	Resonance (enter)		
as in need	is the	Unmixed	Broad-Lipped	Dental	Long	Broad Form
..	..	"	"	"	"	Medium "
..	..	"	"	Fore-Palatal	"	Narrow "
..	..	"	"	"	"	Broad "
..	..	"	"	Rear-Palatal	"	Medium "
..	..	"	Mixed-Lipped	"	"	Narrow "
..	..	"	"	"	"	Broad "
..	..	"	Round-Lipped	Alveolar	"	Medium "
..	..	"	"	"	"	Narrow "
..	..	"	"	Labial	"	Broad "
..	..	"	"	"	"	Medium "
..	..	"	"	Fore-Rear-Palatal	"	Narrow "
..	..	Mixed	Mixed-Lipped	"	"	Broad "
..	..	"	"	"	"	Medium "
..	..	"	Round-Lipped	Alveolar-Fore-Palatal	"	Narrow "
..	..	"	"	"	"	Broad "
..	..	"	"	Labio-Dental	"	Medium "
..	..	"	"	"	"	Narrow "
..	..	"	"	"	"	Medium "
..	..	Unmixed	Broad-Lipped	Dental	Short	Narrow "
..	..	"	"	"	"	Primarily Accented
..	..	"	"	Fore-Palatal	"	Secondarily
..	..	"	"	"	"	Obscurely
..	..	"	"	"	"	Primarily
..	..	"	"	"	"	Secondarily
..	..	"	"	Rear-Palatal	"	Obscurely
..	..	"	"	"	"	Primarily
..	..	"	Round-Lipped	"	"	Secondarily
..	..	"	"	Alveolar	"	Obscurely
..	..	"	"	"	"	Primarily
..	..	"	"	"	"	Secondarily
..	..	"	"	Labial	"	Obscurely
..	..	"	"	"	"	Primarily
..	..	"	"	"	"	Secondarily
..	..	"	"	Fore-Rear-Palatal	"	Obscurely
..	..	"	"	"	"	Primarily
..	..	Mixed	"	"	"	Secondarily
..	..	"	"	Alveolar-Fore-Palatal	"	Obscurely
..	..	"	"	"	"	Primarily
..	..	"	"	"	"	Secondarily
..	..	"	"	Labio-Dental	"	Obscurely
..	..	"	"	"	"	Primarily
..	..	"	"	"	"	Secondarily
..	..	"	"	"	"	Obscurely

The

(2) DESCRIPTIVE CLASSIFICATION OF THE CONSONANT SOUNDS

Exemplification	Nature	Organic Formation	Form	Kind
m as in boom	Unmixed	Labial †	Voiced	Monosound
" met	"	Labio-Dental	Voicelless	"
w " beew *	"	Dento-Alveolar-Lingual †	Voiced	"
" wet	"	"	Voicelless	"
n " dean	"	"	Voiced	"
" net	"	"	Voicelless	"
l " vail	"	"	Voiced	"
" let	"	"	Voicelless	"
y " beey *	"	Lingua-Alveolar-Palatal	Voiced	"
v " yet	"	"	Voicelless	"
r " burr	"	Lingua-Palatal	Voiced	"
" timber	"	"	Voicelless	"
r " rot	"	" Trilled	Voiced	"
h " beeh *	"	"	Voicelless	"
" hot	"	"	Voiced	"
b " lobe	"	Labial	Voicelless	"
d " bet	"	Labio-Dental	Voiced	"
v " eve	Mixed	Dento-Alveolar-Lingual	Voiced	"
" vet	"	"	Voicelless	"
f " feed	Unmixed	"	Voiced	"
d " din	"	"	Voicelless	"
dh " lath	Mixed	"	Voiced	"
dh " then	"	"	Voicelless	"
j " age	Comp-Mixed	Lingua-Alveolar-Palatal	Voiced	"
" jack	"	"	Voicelless	"
" haze	Unmixed	Lingua-Palatal	Voiced	"
z " zip	"	"	Voicelless	"
zh " rouge	Mixed	"	Voiced	"
zh " azure	"	"	Voicelless	"
ng " long	"	" †	Voiced	"
" sling	"	"	Voicelless	"
gh " Tag	"	"	Voiced	"
" legen	"	"	Voicelless	"
gh " dog	Unmixed	"	Voiced	"
g " got	"	"	Voicelless	"
p " pat	"	Labial	Voiced	"
" fat	"	Labio-Dental	Voicelless	"
t " ten	Mixed	Dento-Alveolar-Lingual	Voiced	"
" thin	Unmixed	"	Voicelless	"
th " check	Comp	Lingua-Alveolar-Palatal	Voiced	"
t-sh " sit	Unmixed	"	Voicelless	"
sh " shun	Mixed	"	Voiced	"
n " mon-key	Imperfect	"	Voicelless	"
" ach	Mixed	" †	Voiced	"
kh " ktt	Unmixed	"	Voicelless	"
k " ktt	"	"	Voiced	"

* Improvised words—bring out the voiced form.

III

THE EXEMPLIFICATION OF THE PRONUNCIATION OF THE SPEECH SOUNDS

83. This Topic will be considered under: First, The Standard of Pronunciation; Second, Usage—Not the Standard; Third, The Organic Fixedness of the Sounds; Fourth, Speaking is Instinctive; Fifth, The Typical Forms; Sixth, Points to be Remembered in the Pronunciation; Seventh, The Exemplification of the Sounds; and Eighth, The Different Positions in which All the Forms Occur.

84. First. The Standard of Pronunciation. As the organs of speech of all mankind are alike, as every speech sound is formed at a certain place in the mouth, with certain mouth parts, and with a certain adjustment of such mouth parts, and these, together, give to the sound its characteristic quality, every speech sound has a physiologically correct pronunciation that is alike the world over. This is the Standard of Pronunciation for the Speech Sounds.

85. Second. Usage—Not the Standard. While usage regulates of what sounds a word must be composed, the pronunciation of such sounds does not depend upon usage—upon how the sounds are pronounced in good society or in educated circles in New York, Boston, London, Paris or Berlin; it is a question of what the physiologically correct pronunciation of the sound is. If an individual, a com-

munity, a section of a country, or even a whole nation, were to form, for example, the \bar{e} sound at the place of the \bar{a} , so that it should partake to a degree of that sound; or were to form it at the place of the u , so that it should partake to a degree of that sound; or were to form it at the place of any other vowel, so that it should partake to a degree of that sound; or were otherwise to form it incorrectly;—it would not establish the pronunciation of such erroneous formation as the correct pronunciation for the sound. The fact that a sound can, organically, be variously incorrectly formed only goes to show that within all its incorrect formations there is an organically correct formation for the sound and to that we must look for its correct pronunciation.

86. Third. The Organic Fixedness of the Sounds.

Nature has given us speech for the purpose of communicating our thoughts to our kind; and, to do so intelligibly, we must utter the sounds alike. To enable us to do this, nature has given us organs of speech that are alike; that form sounds alike; and that utter sounds that are alike. And it has so differentiated the sounds that they are distinguishable in fluent speaking, if they are reasonably well formed. Therefore, that speech may not degenerate into an unintelligible confusion, *Nature* has fixed a standard, an organically typical pronunciation, for each speech sound.

87. (1) *Distinctiveness of the Speech Sounds.* The 43 speech sounds consist of two essentially different kinds, vowels and consonants—tone forms and noise forms. The vowels consist of eight, about equidifferent, correlative couplets, the two sounds in each couplet varying by a common, audibly easily discernible

difference into a long and a short. The consonants consist of two, audibly different, parallel series, seven monosounds and ten sonants, the two kinds about equidifferent within themselves; then each of the ten sonants varied by a common, audible difference into a sonant and surd couplet.

88. (2) In the Minor Forms. As the minor forms are compelled from physiological necessity, the sounds naturally take their correct forms under their respective conditions, and when correctly uttered do not break down nature's distinction, as the following shows: (a) *Of the Vowels*. Each long vowel has varied into a broad, a medium and a narrow form, but that does not change either the quantity or the quality of the long into that of the short. This can be seen in the *ā*, in *laid—late—prelate*; for the *-late* in the last word, when correctly pronounced, is not *lēt* but *lāt*,—exactly as in the second, but with less accent. Each short vowel has varied into a primarily, a secondarily, and an obscurely accented form; but that does not change either the quantity or the quality of the short into that of the long. This can be seen in the *ě* in *pet—sunset—millet*. An *ě* remains an *ě* through all the diminishing degrees of accent.

89. (b) Of the Consonants. Each of the seven monosounds and each of the ten sonants has varied into a voiced and a voiceless form; but that does not convert the voiceless form of either into a surd that also is not voiced. This can be seen in the difference between such voiceless form of the *d* and of the *t* (surd) in *missed—mist, packed—pact, tinned—tint*, which are at the limit of audible distinction. Neither does it convert the voiced form into a vowel, as can be seen in *East—yeast, ewe—you, idiom—yum*, etc.

90. Fourth. Speaking is Instinctive. A child learns to speak by instinct—the sum total of acquired speaking habits inherited from its ancestors—and by imitation. Therefore, and as the adjustment of the mouth parts in producing the sound is very complicated and profound, a child should hear the sound correctly pronounced by others and should then be trusted to let its speaking instinct guide it in putting the mouth into the right shape. If more is needed the organic formation of the sound must be explained.

NOTE. One cannot be taught to produce a beautiful tone by a minute description of the adjustment or by a "tape line" measurement. The adjustment of the mouth is profound and a sound is an audible phenomenon that must be judged by the ear. Let one adjust his mouth from description and listen as he thus forms the sound *as well as he can*, slightly varyingly, until he hears a clearer tone or sound coming out. Then he must try to bring out such quality more and more until he perfects it.

91. (1) Foreign Sounds. Sounds that are not vernacular can hardly be learned without an oral instructor, for a sound is an audible phenomenon and addresses itself to the hearing. Its audible peculiarities, therefore, are perceived by the ear. A child has usually no instinctive propensity to pronounce a foreign sound and in the adult the organs by long use have become set in other directions so that it is more difficult for an adult with stiff organs to learn to pronounce an unfamiliar sound than it is for a child whose organs are pliable.

92. (2) Correction of Stubborn Errors.—(a) Of the Vowels. Errors in the pronunciation of the vowels are nearly always caused by forming the vowel with the wrong resonance center, so that an explanation and a correction of this, and articulating the vowels for

the learner, formed at every incorrect and at the correct place, until the learner understands what the correct sound is, will usually correct the pronunciation. If the position of the lips is wrong, that also can be explained. If more is needed the organic formation of the particular vowel must be referred to. (See ante, page 70, note.)

93. (b) Of the Consonants. In the consonants, as for example, where a child says *ting* for *king* or *peas* for *please*, the error is clearly in that the child does not put its mouth into the shape to utter the *k* and the *l* sounds. In such cases it is not enough simply to tell the child so and to articulate the word correctly for it. The child has formed a habit—has worn a *groove* in which it moves—in so uttering the word, or in so omitting the sound in that connection. The child must, therefore, be made, understandingly, to put its mouth parts, step by step, into their correct positions and, when it has them so, *then* to utter the sound. Sometimes a change in the connection will accomplish the result, as when a child, who says *ting* for *king*, can say *taking*; it can generally be made to say *taking*, *ta-king*,—*king*.

94. Fifth. The Typical Forms. The most highly developed forms of the speech sounds constitute their typical forms. Such form is the broad in the long vowels, the primarily accented in the short vowels, the voiced form in the sonants and monosounds, and in the surd when it is final * and attaches to a primarily accented short vowel.

95. Sixth. Points to be Remembered in the Pronunciation.—(1) As to the Vowels. It must be remem-

* In a final position the surd is pronounced nearer as it is in isolation. See ante, page 21, par. 40 and 41.

bered, however, (a) that a vowel must be formed at the right resonance center and with the same resonance center throughout the utterance of the vowel—if pronounced with two successive resonance centers the sound will be diphthongal; (b) that for the long vowels the adjustment must be close and firm and that the sound must be uttered deliberately and emphatically and must continue long enough to let it develop; (c) that for the short vowels the adjustment must be looser and the sound must be uttered rapidly and emphatically; and (d) that an equally great—a common—difference must be made between the long and the short vowel in each class.

96. (2) As to the Consonants. (a) The voiced form must be well developed; (b) the monosounds *h*, *w*, and *y* do not, in English and in German, occur at the end of a word, hence their voiced forms do not occur in these languages; but as the form exists in the voice, and as some or all of such forms occur in other languages, the voiced form of these sounds should be learned; (c) as the *ñ* is an imperfect—an incomplete—sound, not adapted for a final position and does not so occur in either English or German but does occur in them medially at the end of a syllable (and within the syllable) where it is really a pretty sound, it will be only so exemplified.

97. Seventh. The Exemplification of the Sounds. The exemplification of the typical forms of the 43 speech sounds follows. The exemplifying words are such that in popular pronunciation the exemplified sound is usually given approximately its correct sound, and are such that the connecting sounds do not seriously interfere with the exemplified sound's correct pronunciation. In pronouncing the exemplifying words do not forget "The Points to be Remembered."

THE EXEMPLIFICATION OF THE SOUNDS

First. Of the Vowels. (1) *The Broad Form of the Long.*

1. *The ē Sound.*—Bee, fee, thee, wee—feed, heed, meed, weed—keen, queen, seen, ween.

2. *The ā Sound.*—Gay, lay, pay, way—bade, fade, made, wade—bays, lays, rays, ways.

3. *The ä Sound.*—Ah, bah, ma, pa—odd, pod, rod, sod—car, far, par, tar. (All, cog, law, war, etc., have this sound when correctly pronounced.) (See ante, page 71, Note 1.)

4. *The ō Sound.*—Go, ho, no, so—code, lode, mode, rode—bone, hone, lone, tone.

5. *The ū Sound.*—Blue, flue, glue, rue—crude, Jude, prude, rude—boom, doom, loom, room.

6. *The â Sound.*—Bad, fad, mad, pad—am, dam, jam, ram—care, fare, share, ware.*

7. *The û Sound.*—Burr, cur, fur, purr—herd, bird, word, surd—firm, term, worm, yearn.†

8. *The ü Sound.*—Früh, Süd, grün (German).

(2) *The Primarily Accented Form of the Short.*

1. *The ĭ Sound.*—Bit, hit, pit, wit—dip, lip, nip, tip.

2. *The ě Sound.*—Bet, get, net, pet—beck, deck, neck, peck.

3. *The ǒ Sound.*—Dock, hock, lock, rock—got, lot, not, tot.

4. *The ȏ Sound.*—Son, some, come, ton—cup, pup, sup, up.

* Before *r* the *â* sound has an *ě* vanish.

† The *û* sound is not well developed in English because it is always followed by the *r*, which has a demoralizing effect upon it. Compare the English sound with the German in *schön* and *Öl*.

5. *The u Sound.*—Put, bull, full, pull—book, cook, look, took.

6. *The ă Sound.*—Ask,* cask, mask, task—ash, cash, hash, mash.

7. *The ē Sound.*—Pert, dirt, hurt, wort—jerk, dirk, lurk, work.

8. *The ü Sound.*—Glück, Stück, (German).

Second. Of the Consonants. (1) *The Voiced Form of the Sonants.*

1. *The b Sound.*—Globe, lobe, probe, robe—Abe, babe, cube, tube.

2. *The d Sound.*—Feed, heed, need, weed—fade, made, shade, wade.

3. *The z Sound.*—Blaze, craze, faze, haze—days, lays, pays, ways.

4. *The g Sound.*—Dog, fog, hog, log—bag, nag, rag, tag.

5. *The v Sound.*—Eve, heave, leave, weave—cave, gave, pave, wave.

6. *The dh Sound.*—Breathe, sheathe, bathe, lath^h—clothe, loathe, smooth, soothe.

7. *The zh Sound.*—Rouge.

8. *The ng Sound.*—Gong, long, song, tong—dong, prong, thong, wrong.

9. *The j Sound.*—Age, page, rage, wage—dodge, vodge, liege, siege.

10. *The gh Sound.*—Frag, lag, sag, Tag—Sprach (German—Some give to the g in these words the hard sound as in English frog, log, etc.; usage is divided.)

(2) *The Voiced Form of the Monosounds.*

1. *The l Sound.*—Hole, mole, pole, role—bail, mail, pail, vail.

* In all these words the a must be given the sound of ă, as popularly pronounced, not of ǎ, as in ǎsk, bǎsk, etc.

2. *The m Sound.*—*Boom, doom, loom, room—beam, ream, seam, team.*

3. *The n Sound.*—*Bean, dean, mean, wean—bone, cone, lone, tone.*

4. *The r Sound.*—*Burr, cur, fur, purr—bore, core, more, tore.*

5. *The h Sound.*—*Beeh,* feeh, meeh, teeh* (Improvised words).

6. *The w Sound.*—*Beew,* feew, meew, teew* (Improvised words).

7. *The y Sound.*—*Beey,* feey, mæey, teey* (Improvised words).

(3) *The Surds.*

1. *The p Sound.*—*Dip, hip, lip, tip—pit; pen, pat, puss.*

2. *The t Sound.*—*Bit, hit, kit, wit—tip, ten, tack, tuck.*

3. *The s Sound.*—*Bess, chess, less, mess—sit, sack, sot, sup.*

4. *The k Sound.*—*Dock, hock, lock, rock—kill, kin, kip, kit.*

5. *The f Sound.*—*Cliff, miff, skiff, whiff—fin, fell, fat, fop.*

6. *The th Sound.*—*Breath, death, peth, Seth—thin, thick, think, thank.*

7. *The sh Sound.*—*Cash, dash, hash, mash—ship, shack, shot, shun.*

8. *The ñ Sound.*—*Anchor, banker, canker, hanker—flunky, hunky, monkey, punky.*

9. *The t-sh (ch=t-sh) Sound.*—*Fetch, ketch, sketch, vetch—chip, check, chap, chuck.*

10. *The kh Sound.*—*Ach, Bach, Fach, Dach—ich, mich, sprich, stich* (German).

* The voiced form of the sound must be well brought out.

98. The Exemplification of the Minor Forms.

As the minor forms of both the vowels and the consonants are modifications in the sounds to adapt them to connect fluently with one another, there is a physiological tendency for the sound to take its correct form in its proper connection. Therefore the pronunciation of the minor forms of the vowels is sufficiently exemplified on page 11, and that of the consonants on page 19.* The peculiar position in which each form occurs will, however, be explained.

99. Eighth. The Different Positions in which All the Forms Occur.—(1) **Of the Vowels.** (a) The broad form occurs only at the end of a word either in a final position or before one or more attaching, word-ending consonants, the one next to the vowel being a voiced form sonant or monosound; (b) the medium form occurs in all other positions; and (c) the narrow form, which is always distinguished from the other two by its secondary accent, also occurs in all other positions. The three forms of the short vowels occur in all positions and are distinguished from each other by their different accents. The primarily accented occurs seldom, if ever, in a final position.

100. (2) Of the Consonants. (a) The voiced form of the consonants occurs only when the elastic consonant immediately follows and is attached to a broad form vowel. (b) The voiceless form of the elastic consonants, and the surds, occur in all other positions,—except that the flapped, or trilled, *r* (voiceless) occurs, in English, only *before* vowels and the tremu-

* For the exemplification in German of the speech sounds in all their 93 different forms, see *The Universal Alphabet, in loco*.

lous, or untrilled, *r*, both voiced and voiceless, occurs only *after* vowels.

NOTE. While the use of the voiced form of the sonants and the monosounds before vowels and of the flapped, or trilled, *r* after vowels is neither expeditious nor euphonious and, therefore, not allowable in the present stage of development of the language, when the eventual growth of the vocabulary requires such use of these forms, expedition and euphony will have to give way to greater necessity.

IV

THE NOTATION OF THE SPEECH SOUNDS

101. The Notation of the Speech Sounds. Aside from the ordinary uses of reading and writing, there is a practical and a scientific necessity for a world-wide, uniform, complete and accurate system of notation for the speech sounds. Dictionaries should so exemplify a sound that everyone can understandingly and specifically identify it; schools must be able to represent the sound to the sight intelligently; and phoneticians must be able to symbolize it with scientific accuracy.

102. In the Universal Alphabet. As there are only 43 different speech sounds,—16 vowels and 27 consonants, in the voice,—it requires only 43 different characters or letters to represent them; and as such have been logically devised by the author such letters will appropriately represent the different sounds. These letters with their sound values exemplified will be found in the Universal Alphabet.

NOTE. The Universal Alphabet contains 45 letters, the additional two, being of frequent occurrence in the English language, are as follows: (1) *î*, representing the vowel diphthong *ɪi*; (2) *u*, representing the pure vowel diphthong *iu*, and also the impure with the initial element *ɪ*, and the terminal *u* in either the broad, medium or narrow form.

103. (1) Indication of the Different Forms.—(a) Of the Vowels. (1) *In the Long*, the broad form is dis-

tinguished by its position and its primary accent; the medium is distinguished likewise; and the narrow is distinguished by its secondary accent. (2) *In the Short*, the three forms are distinguished by their different accents. The three accents can be indicated thus: *pet'*—*sunset'*—*millet°*; or the last by the absence of a mark. (b) **Of the Consonants.** (1) *The Voiced* form is distinguished by its position—attached to a preceding broad form vowel; and (2) *The Voiceless* will be distinguished by occurring in all other positions. (But see the *r*, page 64.) (3) The *Surds* are monoforms. Where the forms are further to be contrasted, the three forms of both the long and the short vowels can be distinguished by blackface, Italic and ordinary type; and the voiced, and the voiceless form of the consonants, and the surds, can be similarly indicated. This gives a complete and accurate indication for all the speech sounds throughout all their different forms. Nothing further is needed for either ordinary or scientific purposes.

104. (2) Scientific Discrimination. When phoneticians have occasion to describe (a) forms not used in the language, (b) accidental modifications compelled or induced by differently formed connecting sounds, and (c) perversions, the principles herein will enable them to do this intelligently. For example: (1) The voiced form of the *h*, *w* and *y*; the *ñ* at the end of a word; the voiced form of a sonant or monosound before a vowel. (2) In the effect of connecting-consonants upon a vowel, the paralleling of the vowels and consonants, on page 73, gives the key to the specific modification: as, for example, the *ā* in *ale* with an *ō* vanish (or in *ail* with an *ĩ* vanish); the conversion of the vowel in unaccented *the* and in *-ble* into an *ō*;

the vanish of long vowels before *r* into *ě*; of the *j*, in *judge*, and *sh*, in *shut*, converting the vowel into *ě*; of the *t* and *ř* (the initial part of the *řu* diphthong) converting *nāture* into *nātshur*, etc. (3) Of forming the *ē*, *ā*, *ō* or *u* at the resonance center of the *ä*; of forming the *u* or *ō* broad-lipped; of forming the *ä* (*ô*) gutturally or by trying to fuse the *ä* and *ō*; etc.

It must be remembered: (1) that probably no language employs all the different sounds in the human voice; (2) that probably no language employs all the different forms of all the different sounds that occur in that language; and (3) that no language employs all the different combinations of sounds that occur in every other language or that are possible in the human voice. Further, (4) the same sounds are not equally well developed in all languages; and (5) the errors in pronunciations of the speech sounds vary in different languages, and even within the same language in different localities.

THOROUGHGOING ARTICULATING EXERCISES

HOW THE SOUNDS ARE REPRESENTED THEREIN

105. A work on the Human Speech Sounds, as comprehensive as this work is, would hardly be complete without giving a series of thoroughgoing articulating exercises. Such exercises will, therefore, be formulated. However, as the print types, with which the now alphabetically unrepresented sounds will have to be represented in The Universal Alphabet, are not yet ready, and so as to become familiar with the sound factors of the mixed sounds, the sounds will, in these articulating exercises, be represented as follows:*

VOWEL SOUNDS			
ā by ā	ē by ē	ō by ō	ū by ū
â " â	ě " ě	ô " ô	ų " ų
ǎ " ǎ	ē " ē	û " û	ü " ü
ä " ä	ÿ " ÿ	ö " ö	ù " ù

CONSONANT SOUNDS					
Unchanged			Changed		
bē by <i>b</i>	kā by <i>k</i>	ēs by <i>s</i>	chā by <i>ch</i> †	īsh by <i>sh</i>	
dē " <i>d</i>	ěl " <i>l</i>	tē " <i>t</i>	öch " <i>kh</i>	īth " <i>th</i>	
ěf " <i>f</i>	ēm " <i>m</i>	vē " <i>v</i>	ghěn " <i>gh</i>	thē " <i>dh</i>	
gā " <i>g</i>	ěn " <i>n</i>	wā " <i>w</i>	īng " <i>ng</i>	zhų " <i>zh</i>	
hā " <i>h</i>	pē " <i>p</i>	yā " <i>y</i>	űnk " <i>ñ</i>	zē " <i>z</i>	
jā " <i>j</i>	ör " <i>r</i>				

* In school it were better that the sounds in the inflection exercises were represented in the phonetic letters of The Universal Alphabet, so that children will become familiar with the forms of such letters and with their sound values. In such alphabet each vowel takes the name of its sound as exemplified; the consonants are named as above.

† The *t-sh* sound, the correlative surd of the sonant *j* (*d-zh*).

ARTICULATING EXERCISES

106. Articulating Exercises. To acquire the power to articulate easily, smoothly, and correctly every vowel as it may occur both before and after every consonant, and every consonant and every two-sound consonant combination as they may occur both before and after every vowel, in any language, every child, while young and its organs of speech are pliable, should be thoroughly drilled on the following articulating exercises:

ARTICULATING EXERCISES *

1. THE MONOSOUNDS AND THE VOWELS

mē ēm mēm mī īm mīm	nē ēn nēn nī īn nīn	lē ēl lēl lī īl līl
mā ām mām mē ēm mēm	nā ān nān nē ēn nēn	lā āl lāl lē ēl lēl
mā ām mām mō ōm mōm	nā ān nān nō ōn nōn	lā āl lāl lō ōl lōl
mō ōm mōm mō óm móm	nō ōn nōn nō óm nón	lō ōl lōl ló ol lol
mū ūm mūm mū ūm mūm	nū ūn nūn nū ūn nūn	lū ūl lūl lū ūl lūl
mā ām mām mǎ ǎm mǎm	nā ān nān nǎ ǎn nǎn	lā āl lāl lǎ ǎl lǎl
mô ūm môm mē ēm mēm	nû ûn nûn nû ûn nûn	lû ûl lûl lû ûl lûl
mû ūm mûm mû ūm mûm	nû ûn nûn nû ūn nûn	lû ūl lûl lû ūl lûl
rē ēr rēr rī īr rīr	hē ēh hēh hī īh hīh	wē ēw wēw wī īw wīw
rā ār rār rē ēr rēr	hā āh hāh hē ēh hēh	wā āw wāw wē ēw wēw
rā ār rār rō ōr rōr	hā āh hāh hō ōh hōh	wā āw wāw wō ōw wōw
rō ōr rōr rō ór rór	hō ōh hōh hō óh hóh	wō ōw wōw wó ow wów
rū ūr rūr rū ūr rūr	hū ūh hūh hū ūh hūh	wū ūw wūw wū ūw wūw
rā ār rār rǎ ǎr rǎr	hā āh hāh hǎ ǎh hǎh	wā āw wāw wǎ ǎw wǎw
rû ūr rūr rē ēr rēr	hû ûh hûh hē ēh hēh	wû ûw wûw wē ēw wēw
rû ūr rūr rû ūr rūr	hû ūh hûh hû ūh hûh	wû ūw wûw wû ūw wûw
yē ēy yēy yī īy yīy	yā āy yāy yē ēy yēy	
yā āy yāy yō ōy yōy	yō ōy yōy yó oy yóy	
yū ūy yūy yū ūy yūy	yū ūy yūy yū ūy yūy	
yā āy yāy yǎ ǎy yǎy	yô ôy yôy yē ēy yēy	
yû ūy yûy yû ūy yûy	yû ūy yûy yû ūy yûy	

* Read the columns for each letter downward, and in no case connect a succeeding syllable with a preceding. Bring out the final consonants well. After the long vowel give the voiced form to all sonants and monosounds.

2. THE SONANTS AND THE VOWELS

bē ēb bēb bī īb bīb bā āb bāb bē ēb bēb bā āb bāb bō ōb bōb bō ōb bōb bó ób bób bū ūb būb bų ūb būb bā āb bāb bǎ ǎb bǎb bû ûb bûb bē ēb bēb bû ûb bûb bû ûb bûb	vē ēv vēv vī īv vīv vā āv vāv vē ēv vēv vā āv vāv vō ōv vōv vō ōv vōv vó óv vób vų ūv vųv vų ūv vųv vā āv vāv vǎ ǎv vǎv vû ûv vûv vē ēv vēv vû ûv vûv vû ûv vûv	dē ēd dēd dī īd dīd dā ād dād dē ēd dēd dā ād dād dō ōd dōd dō ōd dōd dó ód dód dų ūd dųd dų ūd dųd dā ād dād dǎ ǎd dǎd dû ûd dûd dē ēd dēd dû ûd dûd dû ûd dûd
jē ēj jēj jī īj jīj jā āj jāj jē ēj jēj jā āj jāj jō ōj jōj jō ōj jōj jó ój jój jų ūj jųj jų ūj jųj jā āj jāj jǎ ǎj jǎj jú új júj jē ēj jēj jú új júj jú új júj	zē ēz zēz zī īz zīz zā āz zāz zǎ ǎz zǎz zō ōz zōz zó óz zóz zų ūz zųz zų ūz zųz zā āz zāz zǎ ǎz zǎz zû ûz zûz zē ēz zēj zû ûz zûz zû ûz zûz	gē ēg gēg gī īg gīg gā āg gāg gē ēg gēj gā āg gāg gō ōg gōg gō ōg gōg gó óg góg gų ūg gųg gų ūg gųg gā āg gāg gǎ ǎg gǎg gû ûg gûg gē ēg gēj gû ûg gûg gû ûg gûg
dhē ēdh dhēdh dhī īdh dhīdh dhā ādh dhādh dhē ēdh dhēdh dhā ādh dhādh dhō ōdh dhōdh dhō ōdh dhōdh dhó ódh dhódh dhų ūdh dhųdh dhų ūdh dhųdh dhā ādh dhādh dhǎ ǎdh dhǎdh dhû ûdh dhûdh dhē ēdh dhēdh dhû ûdh dhûdh dhû ûdh dhûdh	zhē ēzh zhēzh zhī īzh zhīzh zhā āzh zhāzh zhē ēzh zhēzh zhā āzh zhāzh zhō ōzh zhōzh zhō ōzh zhōzh zhó ózh zhózh zhų ūzh zhųzh zhų ūzh zhųzh zhā āzh zhāzh zhǎ ǎzh zhǎzh zhû ûzh zhûzh zhē ēzh zhēzh zhû ûzh zhûzh zhû ûzh zhûzh	
ngē ēng ngēng ngī īng ngīng ngā āng ngāng ngē ēng ngēj ngā āng ngāng ngō ōng ngōng ngō ōng ngōng ngó óng ngóg ngų ūng ngųng ngų ūng ngųng ngā āng ngāng ngǎ ǎng ngǎng ngû ûng ngûng ngē ēng ngēj ngû ûng ngûng ngû ûng ngûng	ghē ēgh ghēgh ghī īgh ghīgh ghā āgh ghāgh ghē ēgh ghēj ghā āgh ghāgh ghō ōgh ghōgh ghō ōgh ghōgh ghó ógh ghóg ghų ūgh ghųgh ghų ūgh ghųgh ghā āgh ghāgh ghǎ ǎgh ghǎgh ghû ûgh ghûgh ghē ēgh ghēj ghû ûgh ghûgh ghû ûgh ghûgh	

3. THE SURDS * AND THE VOWELS

pē ēp pēp pī īp pīp pā āp pāp pē ēp pēp pā āp pāp pō ōp pōp pō ōp pōp pō óp póp pū ūp pūp pū úp púp pá áp páp pǎ ǎp pǎp pú úp púp pē ēp pēp pū ūp púp pū úp púp	fē ēf fēf fī īf fīf fā āf fāf fē ēf fēf fā āf fāf fō ōf fōf fō ōf fōf fō óf fóf fū ūf fūf fū úf fúp fā āf fāf fǎ ǎf fǎf fū ūf fūf fē ēf fēf fū ūf fūf fū úf fúp	tē ēt tēt tī īt tīt tā āt tāt tē ēt tēt tā āt tāt tō ōt tót tō ōt tōt tō ót tót tū ūt tūt tū út tút tā āt tāt tǎ ǎt tǎt tū ūt tūt tē ēt tēt tū ūt tūt tū út tút
sē ēs sēs sī īs sīs sā ās sās sē ēs sēs sā ās sās sō ōs sós sō ōs sōs sō ós sóp sū ūs sūs sū ús súp sá ás sás sǎ ǎs sǎs sú ús sūs sē ēs sēs sū ūs sūs sū ús sús	nē ēn nēn nī īn nīn nā ān nān nē ēn nēn nā ān nān nō ōn nōn nō ōn nōn nō ón nóñ nū ūñ nūñ nū úñ nún ná āñ nāñ nǎ ǎñ nǎñ nú úñ nún nē ēñ nēñ nú úñ nún nú úñ nún	kē ēk kēk kī īk kík kā āk kāk kē ēk kēk kā āk kāk kō ōk kók kō ōk kōk kó ok kók kū ūk kúk kú úk kúk kā āk kāk kǎ ǎk kǎk kú úk kúk kē ēk kēk kū ūk kúk kú úk kúk
thē ēth thēth thī īth thīth thā āth thāth thē ēth thēth thā āth thāth thō ōth thōth thō ōth thōth thó óth thóth thū ūth thūth thū úth thúth thā āth thāth thǎ ǎth thǎth thū ūth thūth thē ēth thēth thū ūth thūth thū úth thúth	chē ēch chēch chī īch chīch chā āch chāch chē ēch chēch chā āch chāch chō ōch chōch chō ōch chōch chó óch chóch chū ūch chūch chú úch chúch chā āch chāch chǎ ǎch chǎch chū ūch chūch chē ēch chēch chū ūch chūch chú úch chúch	khē ēkh khēkh khī īkh khīkh khā ākh khākh khē ēkh khēkh khā ākh khākh khō ōkh khōkh khō ōkh khōkh khó ok khókh khū ūkh khūkh khū ūkh khūkh khā ākh khākh khǎ ǎkh khǎkh khū ūkh khūkh khē ēkh khēkh khū ūkh khūkh khū úkh khúkh

* The *t-sh* sound, the correlative surd of *j* (*d+z*h), is in these exercises represented by *ch* as this digraph mostly represents this compound mixed sound in English, as can be seen in *check*, *chair*, *church*, etc.

4. THE 702 TWO-SOUND CONSONANT COMBINATIONS

1st. MONOSOUND BEGINNING						
mwä	wmä	nmä	lmä	ymä	rmä	hmä
mnä	wnä	nwä	lwä	ywä	rwä	hwä
mlä	wlä	nlä	lnä	ynä	rnä	hnä
myä	wyä	nyä	lyä	ylä	rlä	hlä
mrä	wrä	nrä	lrä	yrä	ryä	hyä
mhä	whä	nhä	lhä	yhä	rhä	hä
mpä	wpä	npä	lpä	ypä	rpä	hpä
mfä	wfä	nfä	lfä	yfä	rfä	hfä
mtä	wtä	ntä	ltä	ytä	rtä	htä
mthä	wthä	nthä	lthä	ythä	rthä	hthä
mchä	wchä	nchä	lchä	ychä	rchä	hchä
msä	wsä	nsä	lsä	ysä	rsä	hsä
mshä	wshä	nshä	lshä	yshä	rshä	hshä
mñä	wñä	nñä	lñä	yñä	rñä	hñä
mkhä	wkhä	nkhä	lkhä	ykhä	rkhä	hkhä
mkä	wkä	nkä	lkä	ykä	rkä	hkä
mbä	wbä	nbä	lbä	ybä	rbä	hbä
mvä	wvä	nvä	lvä	yvä	rvä	hvä
mdä	wdä	ndä	ldä	ydä	rdä	hdä
mdhä	wdhä	ndhä	ldhä	ydhä	rdhä	hdhä
mjä	wjä	njä	ljä	yjä	rjä	hjä
mzä	wzä	nzä	lzä	yzä	rzä	hzä
mzhä	wzhä	nzhä	lzhä	yzhä	rzhä	hzhä
mngä	wngä	nngä	lngä	yngä	rngä	hngä
mghä	wghä	nghä	lghä	yghä	rghä	hghä
mgä	wgä	ngä	lgä	ygrä	rgä	hgä

2D. SONANT BEGINNING

bmä	vmä	dmä	dhmä	jmä	zmä	zhmä	ngmä	ghmä	gmä
bwä	vwä	dwä	dhwä	fwä	zwä	zhwä	ngwä	ghwä	gwä
bnä	vnä	dnä	dhnä	jnä	znä	zhnä	ngnä	ghnä	gnä
blä	vlä	dlä	dhlä	jlä	zlä	zhlä	nglä	ghlä	glä
byä	vyä	dyä	dhyä	jyä	zyä	zhyä	ngyä	ghyä	gyä
brä	vrä	drä	dhrä	jrä	zrä	zhrä	ngrä	ghrä	grä
bhä	vhä	d-hä	dhhä	jhä	z-hä	zhhä	ng-hä	ghhä	g-hä
bpä	vpä	dpä	dhpä	jpä	zpä	zhpä	ngpä	ghpä	gpä
bfä	vfä	dfä	dhfä	jfä	zfä	zhfä	ngfä	ghfä	gfä
btä	vtä	dtä	dhtä	jtä	ztä	zhtä	ngtä	ghtä	gtä
bthä	vthä	dthä	dthhä	jthä	zthä	zhthä	ngthä	ghthä	gthä
bchä	vchä	dchä	dchhä	jchä	zchä	zhchä	ngchä	ghchä	gchä
bsä	vsä	dsä	dhsä	jsä	zsä	zhsä	ngsä	ghsä	gsä
bshä	vshä	dshä	dshhä	jshä	zshä	zhshä	ngshä	ghshä	gshä
bñä	vñä	dñä	dhnä	jñä	zñä	zhñä	ngñä	ghñä	gñä
bkhä	vkhä	dkhä	dkhhä	jkhä	zkhä	zhkhä	ngkhä	ghkhä	gkhä
bkä	vkä	dkä	dhkä	jkä	zkä	zhkä	ngkä	ghkä	gkä
bvä	vvä	dvä	dhbä	jbä	zbä	zhbä	ngbä	ghbä	gbä
bdä	vdä	dvä	dhvä	jvā	zvā	zhvā	ngvā	ghvā	gvā
bdhä	vdhä	ddhä	dhdä	jdä	zdä	zhdä	ngdä	ghdä	gdä
bjä	vjä	djä	djhä	jdhä	zdhä	zhdhä	ngdhä	ghdhä	gdhä
bzä	vzä	dzä	dhzä	jzä	zjä	zhjä	ngjä	ghjä	gjä
bzhä	vzhä	dzhä	dzhhä	jzhä	zzhä	zhzä	ngzä	ghzä	gzä
bngä	vngä	dngä	dhnngä	jngä	zngä	zhngä	ngzhä	ghzhä	gzhä
bghä	vghä	dghä	dghhä	jghä	zghä	zhghä	ngghä	ghngä	gngä
bgä	vgä	dgä	dhgä	jgä	zgä	zhgä	nggä	ghgä	ggä

3D. SURD BEGINNING

pmā	fmā	tmā	thmā	chmā	smā	shmā	nmā	khmā	kmā
pwā	fwā	twā	thwā	chwā	swā	shwā	nwā	kwā	kwā
pnā	fnā	tnā	thnā	chnā	snā	shnā	nnā	khnā	knā
plā	flā	tlā	thlā	chlā	slā	shlā	nlā	khlā	klā
pyā	fyā	tyā	thyā	chyā	syā	shyā	nyā	khyā	kyā
prā	frā	trā	thrā	chrā	srā	shrā	nrā	khrrā	krā
phā	fhā	t-hā	thhā	chhā	s-hā	shhā	nhā	khhā	k-hā
pfā	fpā	tpā	thpā	chpā	spā	shpā	npā	khpā	kpā
ptā	ftā	tfā	thfā	chfā	sfā	shfā	nfā	khfā	kfā
pthā	fthā	tthā	thtā	chtā	stā	shtā	ntā	khtā	ktā
pchā	fchā	tchā	thchā	chthā	sthā	shthā	nthā	khthā	kthā
psā	fsā	tsā	thsā	chsā	schā	shchā	nchā	kchchā	kchā
pshā	fshā	tshā	thshā	chshā	sshā	shsā	nsā	khsā	ksā
pñā	fñā	tñā	thñā	chñā	sñā	shñā	nshā	kshshā	kshā
pkhā	fkhā	tkhā	thkhā	chkhā	skhā	shkhā	nkhā	khnā	kñā
pkā	fkā	tkā	thkā	chkā	skā	shkā	nkā	khkā	kkhā
pbā	fbā	tbā	thbā	chbā	sbā	shbā	nbā	khbā	kbā
pṽā	fṽā	tṽā	thṽā	chṽā	svā	shṽā	nṽā	khṽā	kṽā
pdā	fdā	tdā	thdā	chdā	sdā	shdā	ndā	khdā	kdā
pdhā	fdhā	tdhā	thdhā	chdhā	sdhā	shdhā	ndhā	khdhā	kdhā
pjā	fjā	tjā	thjā	chjā	sjā	shjā	njā	khjā	kjā
pzā	fzā	tzā	thzā	chzā	szā	shzā	nzā	khzā	kzā
pzhā	fzhā	tzhā	thzhā	chzhā	szhā	shzhā	nzhā	khzhā	kzhā
pngā	fngā	tngā	thngā	chngā	sngā	shngā	ngā	khngā	kngā
pghā	fghā	tghā	thghā	chghā	sghā	shghā	nghā	khghā	kghā
pgā	fgā	tgā	thgā	chgā	sgā	shgā	ngā	khgā	kgā

Other vowels, either long or short, can be substituted for the *ā* and such exercises can also be extended to practicing with the vowel before the two consonants. A vowel is sometimes *followed* by four and even by five consonants, as in: *beg'd'st*, *dream'd'st*, *hang'd'st*, *hold'st*, *kick'd'st*—*burn'd'st*, *furl'd'st*, *hurl'd'st*, *spurn'd'st*, *turn'd'st*, etc. It is even possible so to utter six or seven consonants as in *hurlndst*, *hurlnpdst*. Notice that all such words end in *dst*.

It must not be expected that all these two-sound consonant combinations, although they *precede* the vowel, will combine as smoothly as diphthongs; the object is to exercise the voice in consonant pronunciation.

With practice on such articulating exercises *jaw-breakers* in foreign languages lose their terror.

NOTE. As man is endowed above his fellow creatures with the high gift of speech—the special means for communicating his thoughts to his kind; as the elements of speech (the sounds) are as limited as is herein shown; and as each sound has its physiologically correct pronunciation;—is man not grossly neglecting one of the highest and most beautiful gifts with which he has been favored, when he does not learn to utter each sound within the compass of the voice physiologically correctly and beautifully, as nature so clearly intends? Should not the schools so teach the sounds?

Conclusion. The foregoing analysis reduces the human speech sounds to a complete, perfect, symmetrical, intelligent, simple, practical system. It is complete in that it establishes all the different speech sounds in the human voice; perfect, in that it analyzes them through all their series, classes, kinds and forms to the limit of audible distinction; symmetrical, in that it shows the series, classes, kinds and forms rounded out regularly, and shows that what pertains to one of the individuals of such division belongs to all; intelligent, in that it addresses itself to and satisfies one's reason; simple, in that school children in the grades can understand and can learn it; and practical, in that its principles can be applied by all in their speaking.

As the author has spent twenty years in investigating this and the other three, closely allied subjects, he presents this compact, little treatise in the hope that it may benefit mankind somewhat in proportion to the immense labor that he has bestowed upon it.

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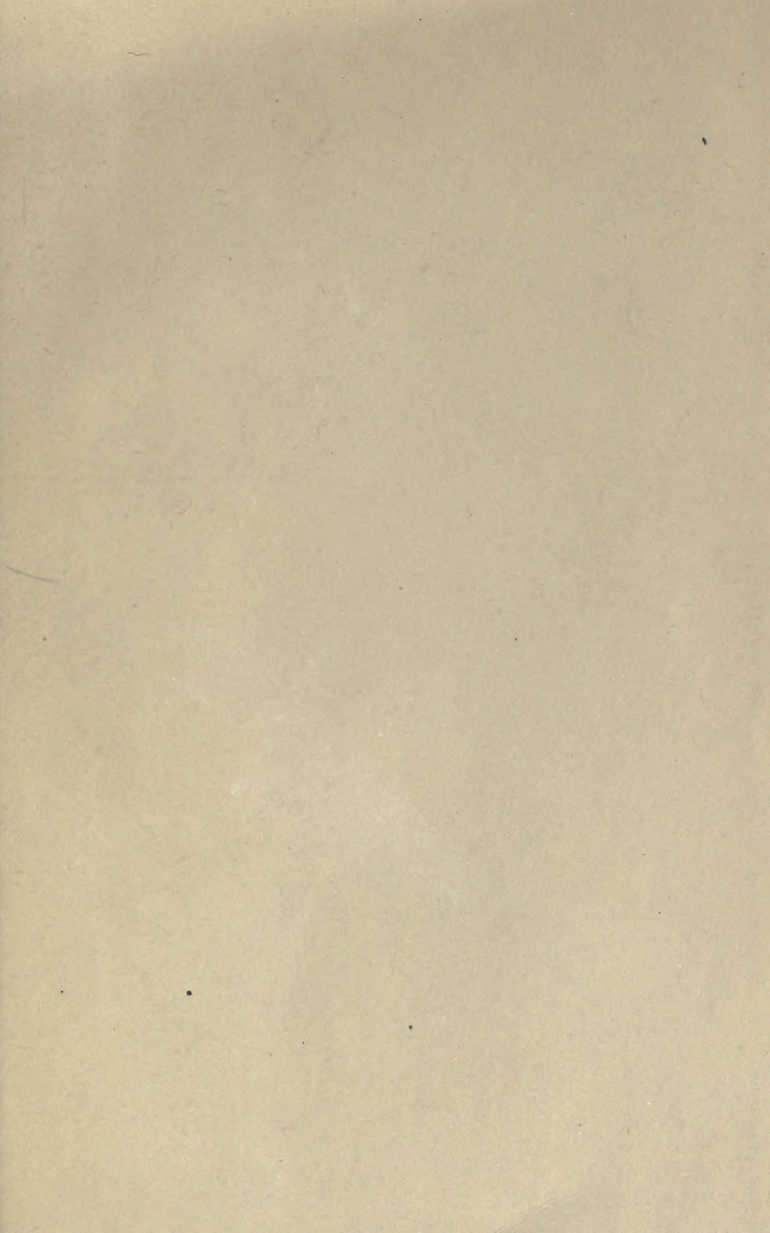
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Author Luthy, Charles T.

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