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THE STATE OF THE ART: AN INTRODUCTION

Rudolf Arnheim
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As I look back at our conference on learning in art, my view is momentarily distracted by the memory of an even more recent event, a quick journey to Japan where the provincial government of Kanagawa Prefecture had invited me to serve on the jury for their first international competition of children's art. An avalanche of paintings and drawings had arrived from twenty-six countries, and as I looked at the final thousand examples spread for us on the floor of a large meeting room in Yokohama, my overall impression added up to the exhilarating conclusion that modern art education has arrived all over the world.

This conclusion may have been rash. The thousand samples I saw were the remains of many screenings, beginning with the selection by the teachers who had decided to participate in the competition. We received no information on the average product of all those schools. We could tell, however, by what criteria the selections had been made, and this in itself was reassuring. The outcome was delightful. There was freshness and spontaneity everywhere. A free use of shape and color distinguished not only the work of preschool and early grades but kept up, with increasing subtlety and lifelikeness, through those middle years which we relegate so readily to the trough of the U-curve. At the level of junior high school, much difference in subject matter and, to some extent, in style distinguished the entries of the various countries. But even the work from some of the totalitarian countries, which in former years suffered from the deadening routine of "socialist realism," testified to the unbridled imagination of the young and thereby to the victory of the principles for which the pioneers of art education have been fighting through our century.

If that is true, it does not mean, however, that art education has settled in its final form and now rules unchallenged and unexamined. To judge from our conference at Champaign, the opposite is fortunately the case. I can put the following few pages to no better use than to comment on some of the trends reflected in the proceedings of the conference.

Art education may be said to have begun in the last century as the more or less mechanical training in how to draw geometrical shapes or copy faithfully from various models. The great break came when it was recognized that the young mind, when freed and encouraged, can develop a remarkable ability of formal control and expression and use it to cope with the sensory complexities of the world. Also, with the advent of modern art, it became clear that the work of children enriches the imagery of the entire culture in ways not available from other sources. Gradually this wholesome approach entered the capillaries of the public school systems, even though it required more sensitivity and imagination on the part of the teacher than did the traditional drill.

Reduced to an oversimplifying rule, the new doctrine prescribed that the teacher leave the child alone, even though to teach nothing is almost as unsatisfactory as to teach everything. In reacting against this restriction, some of the more interesting developments have occurred in recent years.

Psychologists have entered the scene and, not content with observing passively through the one-way screen, have brought to bear their experimental techniques on some of the unsolved problems of child art. It had been recognized that the mere analysis of the finished product left many questions unanswered. Much could be learned from watching the children do their work and from questioning them about its meaning. Also, longitudinal studies illustrated the development over time in an individual child's pictures. Beyond that we now have active experimentation, of which some of the contributions to the present symposium offer significant samples.

There was, first of all, the possibility of questioning the children themselves about aspects of their drawings on which, up to then, we had only the speculative interpretations of adults. Why were they doing things the way they were doing them, and which solutions of graphic problems looked right, which looked wrong? Children could be asked, furthermore, to do things they were not doing spontaneously. The results are quite enlightening. Two caveats may not be out of place at this point. First, if by experimental fiat children are induced to do things that they would not do on their own, the results should be welcomed as additions to our knowledge of children's potential, but not thought of as corrections of what we have known about their spontaneous behavior. Forcing pussy willows or forsythias to bloom early does not correct what we know about their natural calendar. Similarly, there is good sense in children's clinging to early conceptions at a certain stage of their natural development, even though by some manipulation they can be made to leap ahead of their time.

This connects with my second caveat, which concerns professional ethics. Experimental psychologists have become sensitive to the well-being of their subjects. In art education, instruction needs to be carefully geared to the readiness of students for certain techniques or tasks that can be imposed upon them but risk interfering with the full exploration of earlier ways of functioning. In the arts, shortcuts tend to be harmful. Since many experiments are in fact instruction, the experimenter should have access to the experience of good art educators in order to be able to tell which kinds of task are likely to be harmless or even helpful and which might cause disorientation.

This is not intended to mean that every intervention at all is to be frowned upon. Such a radical attitude was all but unavoidable among the early pioneers of art education if they wanted to break up the conventional routines. It is true that the same onesidedness showed up also, and less helpfully, in the pioneers' theorizing. They had arrived at the fundamentally important vision of perceptual form growing in lawful stages and in an almost biological fashion, from the simplest to the most complex; and it is in the nature of the dialectic process that the vision tended to be dogmatically exclusive. Mental growth came to be presented as endogenous maturation, independent of, and even in spite of, external influence.

It is against this onesidedness that opposition has necessarily arisen, and to judge from some recent tendencies, environmentalism attempts to take over with a vengeance. It is one thing to point out that, from the very beginning, the organism grows in interaction with the resources of the outer world and that art work, whether figurative or not, makes sense only as a means of coping with the person's inner and outer life situation. It is quite another thing to maintain that development in the arts is essentially a matter of external influence and that this is what it ought to be. Such statements are dangerous because it takes very little for many an insufficiently trained art teacher to re-

vert to mechanical copying from the model and thereby to undo what art education has accomplished in all those decades of struggle.

The question "to copy or not to copy" obscures the problem. No children have ever practiced drawing without looking at nature and "copying" what they saw; they are quite likely also to examine pictures by other children or in books or the mass media and to be influenced by them. What matters, it seems to me, is the attitude in which they respond to the models. Are they trying to replicate mechanically line by line and proportion by proportion, or are they taking the model as a suggestion for a free invention of their own, a product of their judgment and imagination, presented in their own language of form? When in a recently successful manual on how to draw, the author spends many pages on ways of freeing students from intellectual schematization only to teach them at the end of the book how to obtain "correct" dimensions by measuring with the pencil held at arm's length, we are in a sad way indeed.

There is one more issue I would like to mention because it, too, came up at the symposium. It is the question whether or not the paintings and drawings of children are "art." This question seems to have introduced a pseudo-problem. It has led, on the one hand, to overlooking differences that must be acknowledged and, on the other hand, to claiming nonexistent distinctions. Such confusion is inevitable as long as "art" is considered a container in which certain objects belong while others do not. Any such classification is arbitrary and harmful; it may decree that when children draw landscapes for art class they are doing "art," but when they are drawing flowers for nature study they are not. That same classification may decree that up to a certain age children do not make art but above that age they do, or that bad pictures are not art but good ones are.

It is useful to establish that the work of older children has qualities lacking in the work of the younger ones, or that children's mental conception of the nature and purpose of their paintings differs from that of adult artists; but such findings should not be used for classification based on arbitrary criteria.

Art education may be said to have begun in earnest when it was understood that the ability to create and appreciate expressive form is universal. Expressive form pervades everything man and nature produce, and just as the "work of art" is nothing but the finest flower of an ability stirring in every young child, so the professional artist differs in degree but not in kind from the child who decorates his room or dresses up for Halloween. As usual in human thinking, recognition of what things have in common must precede the appreciation of differences.

Thoughts such as these were awakened once again by the contributions to the Champaign symposium. It is by controversy and confirmation that work in art education progresses.

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THE MIND, ART AND HISTORY

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This is the keynote address. The word "keynote" is, of course, a figure of speech. As we all know, in music the keynote is the tonic or "home tone" which sets the harmonic relationships for the whole piece. It is the *A* which is played by the concertmaster in order for the orchestra to tune up together. Such a congruent tuning-up makes it possible for the conductor to come on stage to great applause and begin with the opening bars of the music itself. Please forgive the conceit of this extended metaphor but such a tuning-up is the task that I have set for myself, even though I can scarcely carry a tune.

I would like to attempt to bring together two domains of interest to me. The one with which most of you are much more familiar than I is cognitive processes. The other domain represents my earlier professional commitment as a teacher of art history. I hope that you will tolerate this autobiographical orientation, as well as the fact that what I want to describe — discover may be a better word — comes to me, as Lewis Thomas put it, more as a "strong hunch rather than a scientific assertion."

I intend, then, to explore two models, one derived from history, and the other from cognitive psychology with the hope that there is a meaningful link between the two, and therefore an intellectual chain of continuity between my previous and my present career.

My effort to conjoin these two models will lead me to consider a rationale for the concept of artistic style whereby the form of the work of art expresses the underlying meanings which inform the character of the historical age in which the art object or experience was produced. Furthermore, that meaning is, I believe, a cognitive construct. It is what the mind knows. Let me state my point another way as a matter of introduction.

History can be divided into periods, and each of these periods is given meaning which is uniquely characteristic of that particular period. These meanings are universal as well, but that is another discussion. Furthermore, these meanings are expressed through structures inherent in the variety of symbolic forms or languages of which mankind is capable and of which the arts are a major example. Where do these symbolic languages come from? They are the externalization of that most basic human process, cognitive functioning. It is in this sense at least, that art, making it and discerning it, is an act of intellect.

Perhaps as much an attempt to clarify my thoughts for myself as for this audience, I offer a series of assumptions and assertions for which I believe there exists some evidence:

Cognition is the mental process of thinking and knowing.

The major expression of all mental processing is behavior.

Mental structures are manifest in human behavior.

The patterns of human behavior have discernible meanings.

One major aspect of human behavior is symbolic construction and expression; in short, symbolic behavior.

Discernible meanings are embedded within symbolic systems. Symbolic processes are the externalization of mental functioning.

Keynote address: Symposium for Research in Art, University of Illinois: October 7, 1980.

Symbols and symbol systems have individual meanings that are reflexive, and collective meanings that are interpersonal, or social.
The collective meanings of symbolic systems change over time and in different locations; they are contextual.
The constructins of the mind, the concepts or meanings, are contextual.
The patterns of such collective meanings become the community, society, culture and, retrospectively, history.
Underlying the varieties of human activities incorporated within a time and place, are fundamental patterns of culture.
These patterns can be identified, described and symbolized.
The organization, form, pattern and style of symbolic systems incorporate the meanings of the patterns of culture.
Meaning, in history, is embodied in symbolic systems.
These meanings are generated by and received by the individual as well as the collective mind.
Mental structures determine the structures and meanings incorporated in symbolic systems.

History is the sequence of patterns of behavior, given meaning, and therefore a structure in the patterns of culture that we symbolize. Though each mind is significantly different, as a consequence of social context, significant similarities permeate all minds participating in that place/time context. These collective cognitive similarities are manifest in the symbolic systems generated within the social context, including the arts. Symbolization is the linking of the individual mind, its social context or ecology, and history. The rest of what I intend to say is an elaboration upon this series of premises.

For a number of years before my midlife change to bureaucrat, I taught art history from the framework established by Schliemann, Burkhardt and Wöllflin, and generally based upon the historical conceptions of Kant and Hegel. This framework has a certain philosophical respectability and has appeared in the thought of such diverse thinkers as Gianbattista Vico and Wilhelm Dilthey. They have supported the idea that, within the inexorable flow of the past, periods of time acquire a set of characteristics that distinguish them, in retrospect, one from the other, as a consequence of collective human behavior formulated into the society and culture of that time-period. The Age is determined by and determines the collective mind, the spirit-of-the-age, or the *Zeitgeist*. It is the embodiment of a specific *Weltanschauung* or way of understanding and viewing one's world. While the describable character of any period of time may be attributable to what Collingwood called "the creative historical imagination," it is the case that empirical evidence undergirds such visions of cultural coherence.

When we speak of the Renaissance, the Romantic Era, the Romanesque . . . we assume a set of characteristics which enjoy a paradigmatic uniqueness as well as unity: a pattern or set of patterns manifest in the varieties of human activities subsumed under such terms as economics, theology, politics, science or the arts. They are the patterns of culture and appear in the philosophies, languages and other social dynamics of a particular time.

If my superficial description belabors what may seem obvious (historical platitudes familiar to any freshman), my purpose and justification will lead me to construct a rationale for the concept of style whereby the *form* of the work of art expresses, symbolizes if you will, the underlying meaning which is the character of that age. That meaning is a cognitive construct: It is what the mind knows.

Erwin Panofsky[1] alludes to periods of time as distinguishable portions of history. These portions are given a unity discovered by the historian through "intrinsic analogies" within overtly disparate phenomena such as religious movements, social and political currents and the arts.

Karl Jaspers[2] explains this even more succinctly:

> In the movement of human affairs there are, to our cognition, many lines which run separately from one another and subsequently meet — or particular lines, which, although they recur typically, represent only features of the whole, not the whole itself.
>
> Thus there is the circumscribed sequence of a particular set of cultural phenomena. A few generations cohere in typical stylistic sequences or developments of thought, from their origin to their disintegration.

The coherences to which Jaspers refers are also described by others as organic wholes, powerful cohesions, historical unities with a common character. Let us consider another author who seeks to operate within the context of the history of ideas. W. T. Jones[3] argues for what he calls "operative generalizations" which impose a cultural coherence. He says: ". . . often many sets of specific generalizations share a common style and . . . this common style, because it pervades many different specific backgrounds, characterizes the thinking, and so the behavior, of whole societies."[4] Jones proceeds to identify not only the content of such generalizations, but, more importantly, the *form*. "By 'form' we mean, for instance, the style or manner in which a story is narrated or a logical argument is developed." The importance of the form is such that it illuminates ". . . the underlying drives that characterize a culture." Jones rests his position upon a philosphical justification to which I subscribe. He states that ". . . I happen to hold that in cognition the mind is not in relation to an independently and objectively existing reality but that it is structuring and organizing the reality that it knows."[5] Furthermore, Jones separates himself from Kantian necessity, universality and essential categories by stressing the contextual and relativistic nature of these cognitively produced generalizations. They are the cultural, social and psychological variables.

When Wöllflin described the unifying force inherent within a certain age, such as the Renaissance or the Baroque, he stated that: "The transition from Renaissance to Baroque is a classic example of how a new *zeitgeist* enforces a new form."[6] He felt that the aim of art history was to: ". . . conceive style primarily as expression, expression of the temper of an age and a nation as well as expression of the individual temperament."[7] Wöllflin's *Principles of Art History* constitutes a foundationstone for the historical connections being developed here. He alludes to the ". . . mode of perception which lies at the root of representative arts in the various centuries." The position assumed by these authors and affirmed in this essay is that the character of a period of history is manifest in its generalizations and style and such expressive forms are not whimsical or arbitrary but are determined by a collective mind and will.

The great semiotic philosopher Ernst Cassirer also took pains to establish an interaction between symbolic modes, the coherence of a period of the past and the historian's role in reading the meanings inherent in that culture's various codes:

> The historian not only studies the spoken and written languages of mankind; he tries to penetrate into the sense of all the various symbolic idioms. He finds his texts not merely in books, in annals or memoirs. He has to read hieroglyphics or cuneiform inscriptions, look at colors on a canvas, at statues in marble or bronze, at cathedrals or temples, at coins or gems. But he does not consider all these things simply with the mind of an antiquary who wishes to collect and preserve the treasures of olden times. What the historian is in search of is rather the materialization of the spirit of a former age. He detects the same spirit in laws and statues, in char-

ters and bills of right, in social institutions and political constitutions, in religious rites and ceremonies.[8]

It has been the task of historians to translate, or paraphrase the meanings imbedded in various symbolic modes of the arts. Thereby they create verbal correspondences between the meaning residing in the style of medieval architecture, for example, or manuscript illumination and music, as well as in the style or conceptual framework of medieval scholastic thought.

Heinrich Wöllflin established five basic formal components of the visual arts. These five components, or tools of analysis, reveal a set of visual characteristics in a work of art whereby it becomes possible to attribute a period style. He showed how, when certain formal attributes appeared in the painting or statue, the work was typically Renaissance; but these formal elements were historically to evolve quite dramatically into those formal/stylistic aspects subsequently defined as Baroque.[9]

While Wöllflin did not venture into the larger arena of imbuing these stylistic elements with cultural generalizations or meanings — stating what the significance of Renaissance or Baroque style is to the intellectual forces of that time — he was, nonetheless, among the early art historians to apply analytical tools to "reading" works of art derived from the formal and structural elements rather than biographical or iconographic references. Indeed, his analysis of the linear versus the painterly, the stress upon either the plane or recession into pictorial space, emphasis upon either complexity and multiplicity, or simplicity and unity, upon either closed or open forms — these polar formal elements and their attribution — were most fruitfully interpreted when the two compared works of art were held constant for subject matter. It mattered much less who did it, or what it was, than how it was done, because *that* answered the question of what did it say.

Let me pause for a moment to make my intended path explicit. There is a legitimacy to the position that a culture, or period of time, may be said to have a certain paradigmatic coherence; this coherence has a describable character; this describable character is manifest in the variety of symbolic modes which we segregate (and aggregate) into disciplines such as language, science, religion, economics or the arts; the non-verbal modes such as architecture and music are as expressive of such basic meanings as is propositional verbal discourse; and these meanings reside in the form. It now needs to be suggested that the form and the techniques that generated them; the skills, control and will to produce them; and, most important, the creation of meaning to inform this symbolic system, derive from — are expressed by — the individual mind or intellect, and this is what we call cognitive process.

Conjure up in the mind's eye three overlapping circles. Each circle represents an element in an interactive system. Circle one stands for the mind, the intellect, or our cognitive processes. The second circle stands for the symbolic codes generated by those cognitive processes, and the third circle represents both reality as we posit it, and history, or the reality of the past.

Many historians have moved through at least two of the three circles in order to link them. W. T. Jones, to whom we referred previously, argues for the connection between ideas and their embodiment in various symbolic codes, the repetition thereof containing the qualities of a period of time. Seeking to establish a valid description of the Romantic Period, Jones analyzes a rich variety of disciplines, including the arts. He says:

> Though ideas themselves are not physical objects, they are communi-

cable only through some sort of symbolism. Since these symbols — the written marks on paper, the colored pigments on canvas — are physical objects, they are easily identifiable. . . . So far, therefore, . . . we are justified in taking the symbols as standing in some definitive relation to the ideas communicated in them . . .

Instead of merely identifying a particular physical object whenever it occurs on the printed page, the analyst must decide what the author means: he must *read,* not merely *recognize* . . . the object of study has subtly changed; it is no longer a physical object (a particular configuration of lines on a piece of paper); it is now the idea of which these squiggles are the sign . . .[10]

It is noteworthy that a historian would take pains to construct the ground for his historical description in terms which seek to justify the connection between data and analysis, that is, the interpretation of data derived from symbolic material warranting interpretation on stylistic and formal grounds. The analogical rather than the explicit symbolic codes need to be "read." I would contend, however, that recognition is reading and that the object remains physical even when imbued with ideational significance; this is the very point of symbols.

Phillip Morrison of MIT, in the second annual Bronowsky lecture, developed a case for two fundamentally different modes of internal representation or modeling. One kind he labeled digital, referring to the use of letters and numbers, language, mathematics, and those codes wherein the morpheme has no iconic or representational connection with the referent. Thus letters and words in print have phonetic but not iconic meaning. The graphic cardinal numbers stand for, but do not appear like, the elements they represent. These letters and numbers become oral and then the written language which, in turn, stands for phenomena.

Yet, we know that the roots of written language are deeply imbedded in a visually representational schematic array of images. While this is not the place to develop the argument, we would do well to consider the connections between the written word and the pictorializing from which it evolved. Most pictures may be, in order to be read, much closer to how the written word operates in our mind than we ordinarily believe, and vice-versa.

The other symbolic mode that Morrison described in his lecture is the analogic. To clarify this distinction, he compared two kinds of clocks. He demonstrated the traditional circular face with its sweeping hands as deriving from the need to recreate and symbolize the motion of the planets and stars as they orbit in their concentric circular universe: a model and microcosm of the Ptolemaic cosmos. In contrast to this dial-faced analogy of heavenly motion, Morrison showed a contemporary digital device, now found on walls and wrists. These watches and clocks conceal, or are entirely without, wheels and internal rotary motion. Both kinds of clocks give the same information, although the one of rotary motion also models our moving universe. Thus, by virtue of their form and the way the mechanics are designed, they present two totally different modes of symbolization. In physics of molecular biology, the analogic/digital contrast may be noted by the physical and analogical model of rods and balls, while the algebraic formula presents the digital version of this information.

In the present discussion we are particularly interested in this distinction between those languages which present abstractions in the form of abstractions — ideas cast into mathematical form or propositional prose, free of the figurative — and the arts on the other hand, wherein reality and abstractions and ideas about reality are woven into the fabric of palpable iconic forms; they are embodied in physical phenomena, material sub-

stance, or the verbalized figurative images thereof. The symbolic analogic power of the arts resides in their real or implied physicality; the rhythms, dissonances and cadences of music, the paint on canvas, the stone and bronze, the steel and glass, the body's motion — in short, the real — makes believe it is something else, in addition to being itself. Therein, contingent upon how these physical events have been organized, the meaning is captured and, upon our perception of the artistic phenomenon, released.

The stones and structure of the medieval cathedral become the analogic embodiment of Scholastic Rationalism and its dialectical fusion with revelation. Giotto's frescoes reveal, by formal analogy, the emerging Renaissance secularism, a sense of physicality and a return to humanism. One can see this in the discovery and representation of the body's bulk, weight and dramatic/emotional gesturing and expression.

The layers of meanings are discernible if not verbally paraphrasable. They can be, indeed must be, knowable. A work of art that does not make sense, that is, purport meaning, is nonsense. One major layer of meaning with which any work of art is imbued, derives from the mind-set of the place and time in which it was produced. That layer of meaning is inherent in the conjoining of subject and form, style and technique, adherence to rules and conventions, and departure therefrom.

Writing about the analogic relationships of concurrent styles, Wylie Sypher contended that the art object or experience is a representation, a portrayal "emancipated" from reality. The instrument of that emancipation is the artist's "style," the schema, composition or "form" in which he makes his statement, the structure or organization he imposes upon the object or experience to which he refers.[11]

Sypher proceeds to link the artist's style to technique, pointing out that the formal patterns of the work of art are modified or limited by craft and medium, and these formal patterns themselves come to acquire symbolic meanings. As he puts it, "Technique influences form, and form . . . influences the techniques of representation." (See footnote 3.) Sypher's linkage of style and technique, by which I understand him to mean the productive process of symbol creation and use, is central to his argument:

> Technique is not merely a technical feat: if it is a way of representing what is seen or experienced, then it involves the whole cultural and social world that influences the artist to try to represent reality as he does. If style is a mode of representation, yet the artist is bound to represent the kind of world in which he lives, to which he belongs.[12]

The French structuralist, Roland Barthes (1977), identifies the pictorial image as an "analogon," and like Morrison, sees such analogies or metaphors as symbolic messages. The analogic dimension is the *denoted* component, but the technique and its consequent style are imbued with the *connotation* of the message, and hence its meaning. Since the technique and style of the medium contain the "message," the semantic of the work of art resides in its syntax, or morphology.

A number of theorists, such as Wartofsky, stress the interactive nature of the process wherein the production of symbolic forms of art are determined and simultaneously determine the understood meanings of the experience derived from the milieu. Thus, the artist's modes of thought and his perceptions are determined by the impact of his culture to which he contributes in a cognitive ecology. We learn to read the meanings imbedded in the highly charged artistic symbol, as we learn to see through the lens of the cultural artifacts of a period. As Oscar Wilde suggested: Life imitates Art! Our visual activity as well as our auditory processes, their organizing and symbolizing powers, are formed and trans-

formed by our experience with the body of symbolic material which constitute our environment. We see what we choose to see, we choose to see what and in the way our milieu permits us to see, and what we see is what we symbolize for ourselves and for each other.

It may be useful to return, for a moment, to the historian's framework and consider a description of a whole series of historical periods, to characterize the underlying cultural message meanings and the forms that symbolize and express these. Let us develop an extensive example of historical meanings by identifying the sequence of historical phases of Western Civilization by their leading or dominant ideas. William Fleming,[13] in his *Arts and Ideas,* provides us with just such an interpretation. Thus, the Hellenic period could be understood in terms of intellectual perspectives which have been labelled Humanism, Idealism, and Rationalism. In this exercise in the art history of ideas, the several arts each, in content and style, embody the basic meanings subsumed under these labels. The frequency of appearance of certain stylistic trends, and the disappearance or absence of others, provides the accumulation of clues — evidence — that inspires such a compelling interpretation. The use of modular elements in the sculpture of Polycleitus or in the Parthenon, the affirmation of human scale, the famous subtle variations and deviations from the straight lines of the Parthenon, the elements of "proper magnitude" in Aristotle's *Poetics,* and other such stylistic elements all inform the three ideational forces whereby we can understand fifth and fourth century B.C. Greece.

The succeeding period, the Hellenistic, was vitalized by a historical transformation illuminated by the ideas of Individualism, Realism and Empiricism. Polycleitos gives way to the soft sensuousness of Praxiteles. The constraint of reason in the Parthenon alters to become the propagandistic monumentality of the Pergamese *Altar of Zeus.*

We can describe the Roman era in terms of its domination by the compulsion for organization and utilitarian values and attitudes. The roads, the caestra-planned cities, the aqueducts, the symmetry of architecture, the walls and apartment houses all testify to these ideas. The Early Christians, on the other hand, displayed an obsession for mystical and authoritarian perceptions of Christ and their church. The Monastic Romanesque was dominated by a penchant for asceticism and a hierarchical conception of life which pervaded the feudal world as a secular as well as a church body politic. The emaciated figures of the saints on cathedral facades, the organization of the manuscript page, the massive masonry of the churches themselves betray these values.

Scholasticism in the Middle Ages is identified as the dominant mind-set of the Gothic Era, vitalized by the theologians' effort to reconcile Reason and Revelation, or Scholastic Realism, Idealism and Nominalism. This reconciliation could be called the Scholastic Synthesis and may be noted both in the structures of the argument of St. Thomas as well as in the complex and dynamic structures of the vaulted Gothic Cathedrals.

As medievalism evolves into the sunlight of the Renaissance, we note the emergence of a new humanitarianism and interest in nature. By the time of the Florentine quattrocento, these interests have ripened into a scientific frame of mind, coupled with a highly individualistic self-assertion. These traits are exemplified in a typical painting by Piero Della Francesca entitled: *The Flagellation of Christ.* What is presumably a religious painting is, in fact by virtue of its style and organization, anything but. The obsession with linear perspective reflects the preoccupation with the rational re-construction of space, a scientific interest. The three

figures in the foreground loom large; they are the patrons. Christ is diminutive and in the background. The implication is obvious. Three Renaissance portraits daring to use the agony of Christ as background setting!

The classical humanism which dominates the intellectual ferment of the Renaissance transforms into the militancy and mysticism of the counter-reformation Baroque, while the swelling of aristocratic absolutism is seen as both grandiose and controlled by artistic academicism. Set a Botticelli side by side with a Caravaggio or a Tintoretto. Linear clarity has been replaced by a turbulent dark storminess. Calm balance gives way to theatrical spotlighting and plunging diagonals. The times have changed dramatically and the *style,* not the content, expresses this change. Reading the style tells us the meaning of these historical changes.

This historical parade remains vague and arbitrary only until one traces, through concrete examples, the evolution of form. Using the same subject matter throughout such a series of historical periods, we can trace the formal, organizational, stylistic variations which portray totally different meanings, thereby making each art work symbolic of the ideational/intellectual forces which animate the quality and character of the period in which that work was created. Donatello's bronze *David,* at the beginning of the Renaissance, is a modest exercise in adolescent realism when compared to the monumental Michaelangelo *David* of the High Renaissance. Yet, both are studies in balanced classical calm when compared to Bernini's *David* which embodies explosive turbulence, swirling motion and a dramatic play of light and dark, characteristic of the theatricality of the later Baroque and its attempt to agitate the emotions. Although we have delved extensively into only a few periods of Western Civilization, these are most familiar to us. Other periods of time, other cultures, other civilizations could serve our purpose just as well.

The work of art, as a symbol, is conceptually — cognitively — meaningful within its context, both as personal and collectively apprehended icon. The formulas for the carvings of the Egyptian or Archaic Greeks communicate a cultural intention, not a clumsy ineptness; they signal a powerful message, not a primitive inability to portray likenesses. The Kouroi of the 8th century B.C. are as "like" as they need to be.

A major purpose of pictorialization is to maximize the presentation of information. For children, "primitives," or cultures that are ignorant of the possibility of what we could call the quest for photographic illusion, other modes exist for presenting and symbolizing such information. Indeed, an overview of the world's body of art suggests that so-called realism is by no means the pre-eminent style or form for making visual statements.

Arnheim has demonstrated that most peoples seem to prefer a variety of schematic, diagrammatic, and emblematic formats. Map-like images and ideographs appear to be the preferred mode of pictorial construction if one takes both a historical and global perspective. The most salient view of objects, the most readily recognized shape, form or profile lends itself optimally to the transmission of information regarding objects or relationships of objects.

Children taught shading and linear perspective will often perform this skill to please adults, but revert to distorted design-like profiles and silhouettes, ignoring the third dimension, in the drawings in which they please themselves. From this point of view, there need not be a sharp demarcation between the abstract phonemes and digits which embody no visual reference to the outside world to which they address themselves, and pictorializing,

even as extreme as the illusionism of trompe-l'oeil. Children and their comics, the medieval monks and their fusion of words and pictures in manuscripts, the Japanese and Chinese combining calligraphy of poetry and pictures of mountains, clouds and pomegranate trees, are obviously comfortable with such blendings of codes in their symbolic presentations. Whether the morpheme is derived from externally perceived images — the ideograph or the picture — or whether it evolves into the phoneme and numerical code of verbal discourse and mathematics, it needs to be read in order to derive from it its information and the meanings of that information.

Nor does craft, skill, practice, discipline and experience need to be absent in the production of these arts in those cultures and periods that have not discovered or have chosen to ignore the illusionistic mode of image making. Earlier paleolithic cave painting was startlingly realistic (note the subtleties of the Lascaux bison), while later Neolithic art is far more emblematic and pattern-like. Sand painting, masks, Runic stone carvings, tapestry weavings, or cathedral ornamentation incorporate sufficient reference to visual reality within the framework of abstract style to transmit the visual information that they contain.

The contention of Roger Fry and Clive Bell that art is significant form, must be followed by the question, significant of what? Langer's description of the work of art embodying the forms of feeling, such as tension and resolution, is essentially correct but inadequate. That is to say, the work of art is about a great deal more than that. It is rooted in and therefore refers to — means — its historical context and reality. The specific character of mind is knowable and presentable in the symbolic form most appropriate. Such knowing might be conscious, like Renaissance self-awareness, or buried in the collective unconscious, like Romanticism's violent reaction to a perceived excess of reason inherited from the Enlightenment. The consequence of that reaction generated the mind-set reconstituted in the arts during the period 1750 and 1850 which we identify as the Romantic Period.

Lest our emphasis upon the visual arts imply that other artistic media fail to attract similar historical/cognitive interpretations, we would do well to consider an artistic medium inherently devoid of representational images except for the programmatic or descriptive examples which, after all, will not disprove our contentions. In a provocative passage from an essay entitled: *On Thinking About Thinking,* Lewis Thomas[14] seeks to make a connection between mental operations and the production of music:

> Music is the effort we make to explain to ourselves how our brains work. We listen to Bach transfixed because this is listening to a human mind. *The Art of the Fugue* is not a special pattern of thinking, it is not thinking about any particular thing. The spelling out of Bach's name in the great, unfinished layers of the fugue at the end is no more than a transient notion, something flashed across the mind. The whole piece is not about thinking about something, it is about thinking.

I am inclined to disagree somewhat with Thomas. *The Art of the Fugue* is about a special pattern of thinking. It embodies the symbolization of thinking to be sure, but thinking about something. Bach was not only the ultimate Baroque composer. He was, at another level, a conservative academic working in a stylistic mode that was or was soon to become obsolete. He was, and therefore his art is, a product of the Age of Reason. *The Art of the Fugue, The Musical Offering,* the 48 Preludes and Fugues of *The Well- Tempered Clavier,* embody an encyclopedic, textbook approach, rational, analytical, comprehensive and an ef-

fort to cast in the wordless language of music a final taxonomy of all possible contrapuntal devices. Given its obsessive logic and rational organization, *The Art of the Fugue* becomes the archetypal symbol of the Enlightenment, analogous to Diderot's *Encyclopedie,* Newton's *Principia,* and the immense popularity of complex clocks, and thus a kind of musical symbolic logic, at once universal yet specific to its age.

Using the Wöllflin comparative framework, and generalizing from an extensive array of examples, Manfred Bukofzer, in his famous study of Baroque music[15] asserts that the history of artistic styles *is* the history of ideas; he finds that while the music of the Renaissance is characterized by a restrained representation of the words, the Baroque thrived upon affective imitation of words, wherein the text dominated the melodic line and harmonic sequences. While dissonance enjoyed only a restrained use in Renaissance music, appearing on weak beats rather than strong chords, and was used primarily in transition between important chords, the Baroque employed dissonance much more lavishly, on strong beats, within chord sequences, and resolved them downward and upward, not exclusively downward as in Renaissance music. Clearly, from these stylistic elements alone, it is possible to recognize the greater degree of tension and dramatic complexity embodied in the Baroque style.

Since Baroque music is strongly founded upon a basso continuo, or thorough-bass as the unifying line, the various voices are not evenly balanced, as in Renaissance music, but instead are polarized between extremes of high and low. Renaissance music relies on the diatonic melody developed within a narrow tonal range, while Baroque music involves diatonic, chromatic and very wide ranges. Just a few bars from Palestrina of the Renaissance, to the early Baroque music of Monteverdi or Gesualdo will illustrate these differences.

Renaissance music stresses a modal counterpoint governed by the melodic lines operating only secondarily together; Baroque music portrays the development of a tonal center such that the counterpoint is much more dependent upon dominant tone and harmonic relationships in each ensuing chord. The development of tonality, which provides a tonal gravity to the harmonies in Baroque music, parallels the discovery and formulation of gravity in the physical world: that is, the dynamic energy field that attracts the various elements toward a center.

In Renaissance music the chords are by-products of part writing, while in Baroque music and due to its tonalities, the chords are a series of self-contained entities. Renaissance music is dominated by the rhythmic device of a uniform "tactus," mathematically proportioned, and not unlike the linear perspective of the visual arts, while Baroque music is driven by the rhythmic aspects of the verbal material, or other sources extrinsic to the music, such as rippling streams, ascending mountains, echoing caves and the like. The invention of the recitative and the opera coincides with the Baroque, thus enlarging the symbolic repertoire of an age seeking symbolic articulation of its attributes.

Within the gradual evolution of the rules which govern the creation of music or the visual arts and upon which an understanding of such arts depends, changes in technique and therefore style, are not random or coincidental. Rather, they are symbolic expressions which embody the changes of the milieu and the meanings inherent in those changes. The preoccupation with a classicistic orderliness and an attempt to see Nature imbued with the dignified harmony and balance, apparent in the writings of Ficino, Alberti, or Pico della Mirandola,

affirms the Renaissance in its various symbolic manifestations. One hundred and fifty years later, the dramatic and theatrical swirls and diagonals, exaggerated rhythms and intense chiaroscuro, the extended metaphors and metaphysical conceits, the undulating church facades and flamboyant richness of the painterly style of the Baroque is echoed in the shift from a Ptolemaic series of concentric crystalline spheres and circular orbits, to the elliptical complexities of Kepler. For the Renaissance, the earth was in the center, like Leonardo's famous extended human figure set mathematically within a circle and square — perfect geometric shapes. The earth is set to one side, among the planets, by Galileo, Tycho Brahe and their successors, and in Tintoretto's *Last Supper,* the table hurtles diagonally into the darkness, Christ barely discernible. How different than the same subject by Leonardo!

Stylistic differences emerge across space as well as time. Perugino's meticulous Renaissance landscape, filled with linear detail, symmetrical, calm and harmonious, lucid and simple, becomes something very different in the hands of the much later Rubens. *His* landscapes are robust, torrential whirling, dazzling shifts of forward and backward elements, vast canvases that shout the rough textures of the paint and the elemental vitality of the fleshy peasants that populate them. The Flemish, aristocratic Rubens is the embodiment of Baroque painting. But so is his contemporary, the Dutchman, Rembrandt, whose landscapes are much more introspective studies, domesticated and cultivated when compared to those of Rubens. Rembrandt gives us sketchy suggestions bathed in warm lights and soft, deep shadows, the image of Bourgeois culture. Holland and Flanders, geographic neighbors, were culturally alien in many ways. Two different kinds of Baroque society occurred simultaneously; one was an absolutist Catholic monarchy, and its artist thought on the grand aristocratic scale. Holland was animated by a powerful, prosperous, yet tolerant and enlightened middle class. The scale was domesticated and, instead, introspection and character analysis were more appropriate. Rembrandt's sixty self portraits are not the consequence of self-adoration. They represent the same analytical introspective exploration found in the deep recesses of *St. Jerome in his Cell* and other Rembrandt interiors. Though Rubens and Rembrandt might very well choose the same iconographic theme — the same subject matter — each artist develops his representational schema quite differently, not only as a matter of personal style, but because of cultural differences, the meanings of which are contained in the organizational skeleton fleshed out with sensory and formal components, fused into a coherence of meaning and style.

Each artist/symbolizer, working within the conventions, rules and techniques of his medium, alters his material, giving it originality. The form emerges from the conceptual/perceptual organization of the mind, to be cast into the structure of the symbolic form and made meaningful by virtue of the internal and externally stimulated and stimulating experience in the world.

Time and space, the environment of the human organism, are the primary cognitive conditioners. Different meanings and different modes of symbolization — the artistic variations — derive from biological and environmental differences. "Homo Faber," man the obsessive symbol maker, echoes his mental constructions on the walls of the deep recesses of caves, on the acropoli of ancient cities, on the plucking of strings or the weavings of baskets, on the ornaments which adorn the lobes of tribal ears or hang as battle scenes on castle walls.

And now my circle begins to close. Thinking and knowing — cognition

— is an input/output process which takes place for each individual within a collective cultural context. The vehicles for this interchange are the rich varieties of symbolic modes which the mind generates, including the various arts. The eye recognizes another face because it must. This recognition works soon for the newborn and in a short time works as well on the mirror, photograph, sculpture or drawing as it does on that from which the likeness was modeled. In addition, it recognizes meaningfully, the sensory and formal components within which the likeness is shaped. Expanding this notion from the experience of a single drawing, melody or gesture, to a group, indeed a whole body of expressive symbolic phenomena, their meanings shape our thoughts, conceptions, perceptions — the structure of our knowing. Artistic symbolization is the link between our inner and outer worlds; it informs and unifies them. Thus we learn, know, produce knowledge and come to know more.

The mental structures which we produce in our minds and which constitute the framework of our cognitive lives, are echoed in the symbolic forms our minds create and discover. Informed by the content of our conceptions, mediated by our perceptions, vitalized by a variety of concurrent processes, we mentally shape meanings in response to meanings which we have previously received and associated with those structures already residing within our minds.

Whether we are painters or architects, poets or composers, theologians or scientists, we manipulate the materials and codes of our craft in accord with conscious and unconscious dictates of our mental capabilities. We organize and reorganize, present and represent, construct and reconstruct, search and research in accord with a bombardment of information that we voraciously yet selectively absorb. Our milieu, whatever and whenever, is radioactive with meanings embedded in all the codes that we receive. Works of art are particularly rich, especially if we have the instinct, knack, training and or discipline to translate and interpret their meanings.

Just as we make art, so we make history. Both are fictions. Both are symbolic constructs which reiterate the possible structures of our minds. What is possible is limited by what we perceive and conceive and what we make of these preceptions and conceptions. When, in the work of art or in a particular construction of history, we discover what, in a sense, we already knew, such experiences are not unlike musical cadences, math problems that come out even or the AHA! of a discovery and understanding; our minds vibrate with the acquisition of increased mental structuring.

Wylie Sypher, approaching the problem of object, style and history, recognizes the creative act as one of cognitive transformation:

> We shall, of course, assume that the artist in any medium does not present us with objects themselves or experience itself, but instead with a *representation* or *portrayal* of objects and experience; that is, the object or experience appears in art only after it has been reduced or emancipated from actuality. The instrument of reduction or emancipation is the artist's style, the schema, composition, or "form" in which he makes his statement, the structure or organization he imposes upon the object or experience to which he refers. Art filters life. Between us and actuality the artist or writer places a special style or technique-of-representation.[16]

Missing from Sypher's explanation is the cognitive process wherein the mind fabricates the structure of the knowledge whereby we can perceive and know the actuality to which he refers, on the one hand, and read about it in the artistic symbols which, in their form, style and composition, present that structure.

We are all very different, yet very

much the same. Because of this, it is possible for us to tell each other new things, and at the same time to understand them. In our minds, we continuously construct models of reality, as well as plan and control our behaviors within that reality. As we symbolize and share the meanings that reality has for us, and as we accommodate our behaviors among one another, fixing these collective behaviors in symbolic form, we create communities, societies and cultures, in short, history. The rituals, myths, codes, laws, traditions, icons, objects of everyday use, ornaments and decorations, the forms into which we cast our knowledge for preservation and transmission, the legends, fables, songs, stories, fictions, science, religion and art, exist not to make our lives more pleasant, though that is sometimes a significant consequence. While it may be so, Nature and Art do not exist because they are beautiful. We make art because it is meaningful, and among the many meanings that we create, for both Art and Nature, beauty is included.

History is a mental construction, a cosmic scheme for explaining and understanding reality, especially social reality, and its existence in time. Voltaire said that history is a fiction that we all agree to. Like art, it obliges our suspension of disbelief in order to apprehend its meanings. Our understanding of our own times and of those past derives from the rich wealth of evidence which we have created. This evidence is imbued with meanings inherent in the formal structure of the evidential artifacts. The form of the artifacts derives from our symbolizing capacities. These symbolizations are the representational externalizations of our individual conceptual constructions, our thoughts, wishes, lies, dreams, beliefs, ideas. These concepts embody, as cognitive structures, the perceptions of experience derived from external data and internal processing, including the experience of reading and understanding symbols created by ourselves and others.

How does the mind now comprehend previous historical constructs, given the deterministic constraints of the present? It seems to me that the past is a cognitive construction of the mind in the present. We create and constantly recreate our past, shaping and reshaping it in terms that are the consequence of the present. While the physicality of the symbolic object may have changed very little, meanings to its own time have evolved in concordance with the changing temper of the times. All artists are art historians, whether they admit it or not. They learn their craft and its traditions, its techniques and symbolic powers, accepting, altering, rejecting its lessons. We can read the meanings in the symbolic vehicles of the past, not because we know more than did the creators of those expressive events, but because with the distance of time, comprehensive visions become possible, and each succeeding generation adds its own layer of meanings which alter all previous layers.

Modern abstract, non-representational art, in its many styles and configurations, is meaningful as much by what it does not incorporate as by what we do perceive as we confront the object. The same may be said for the apparent strangeness of modern music. The rapidity with which such radical changes took place in the recent history of art, the phenomenal diversity of materials, organizational schema and meanings, themselves betray a significant attribute of the milieu. The total style change that we may trace in the prodigious output of Picasso, wherein every ten years saw a completely new visualization, reflects the rapidity of change of his and our times and a complexity of intellectual and cultural forces, simultaneously vying for recognition. Einstein's relativistic universe and the interpenetration of matter and energy, space and

time, have their analogous dynamic reiterated in the ambiguous relationships of fragmentary facets of the Cubist figure. The Freudian and Jungian world of deep-seated emotional forces, and of mythic and primordial totemic images are analogously reconstructed in Picasso's expressionistic, mask-like portraits and distorted human and animal forms. It is no coincidence that at the same time that the Impressionists were seeking mechanistic methods of recording, at high speed, the effects of light upon the atmosphere and colors of the external world, the camera was being developed, and Zola was creating a fictional form based upon clinical observation and documentation which assumed a scientific "objectivity."

Like the cellular differentiation into bone, muscle or nerve tissue as the blastula develops into the various components of the human embryo, so the mind increasingly specializes its symbolic capabilities. Apart from its universality, which is not at issue in this essay, the mind, at any one time, is historically determined to express a basic set of meanings regardless of the mode of symbolization.

This wandering through history and the human mind had its beginnings during my undergraduate days as a student of William Fleming. He set me on an intellectual journey with concepts that he stated in the following way and his words provide an appropriate conclusion:

> . . . the end result of the artist's labors, springing as it does from the same social source and in turn addressed to it, must have a certain unity. When these aesthetic phenomena are viewed as an interrelated whole, it begins to be possible to speak of a *style,* which might be defined as a synthesis of the outgrowth of man's changing ideas as expressed in the symbolic language of the arts and consisting of certain features shared by them all. The arts thus become a language in symbols and images by which man communicates his ideas of order and the meaning of life . . .[17]

Footnotes

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For most of human history, there seems to have been little interest in the drawings of children; in fact, it is difficult even to locate instances of drawings made by children over one hundred years ago. As part of the general interest in child development over the past century, however, interest in this topic has quickened. And since drawings are among the easiest products of childhood to collect, many parents, educators, and psychologists have saved the drawings which have come their way.

As a result of this activity of collection, observation, and analysis, we know a good deal about the types of drawings that children of different ages are likely to produce, at least within Western society. And, although it has been criticized of late (Golomb, this volume), a consensus has emerged on the principal "stages" of early drawing. Transcending sheer description, two other approaches — the clinical-affective and the cognitive-procedural — have dominated discussions by psychologists on the nature and informativeness of children's drawings.

From a clinical perspective, drawings have been seen as clues to the child's affective life or even as clues to hidden pathology (Alshuler and Hattwick, 1947; Coles, 1967; Erikson, 1963). In the hands of a skilled clinician, such an approach can be extremely valuable. Nonetheless, it is not without its dangers, particularly when applied in a rigid, "cookbook" fashion. The child who draws all of her figures at the bottom of the page may well be expressing a sense of powerlessness; on the other hand, she may be painting at an easel which is positioned too high for her to reach above the bottom of the page. Similarly, the child who uses a great deal of black may be expressing negative feelings. On the other hand, it is possible that he always reaches for the paint in the jar on his left. If this is simply where the black paint is habitually kept, then his paintings will take on dismal hues. In brief, the clinician must be careful to determine that those aspects of children's drawings to be interpreted were produced where alternatives existed, and that they emerge with some regularity across contexts.

Those who have adopted a cognitive approach to children's drawings have used drawings as measures of intelligence (Goodenough, 1926), as indications of the child's conception of space (Freeman, 1980; Piaget and Inhelder, 1956) or of his ability to follow a set of sequential rules (Freeman, 1980; Goodnow, 1977). While this approach differs in many ways from the clinical approach, in at least one way it is similar. From both the clinical and the cognitive orientation, drawings are seen as

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clues to something *else* (presumably of greater or more permanent interest within the child).

Only rarely have drawings been examined in terms of their own intrinsic interest, for example, as objects displaying (at least potentially) some aesthetic properties. In an early set of studies, Meier and his associates (1933, 1936, 1939) raised the question of whether children's drawings possessed some of the properties of adult art works, such as composition and balance. Schaefer-Simmern (1948) examined the organizational principles which underlie drawings by young children and by others unschooled in graphic depiction. More recently, Arnheim (1974) and Golomb (1973) have analyzed children's drawings in terms of the child's incipient grasp of the rules of the graphic medium. Each of these lines of study is quite promising, but, with the exception of Golomb (1973; this volume), none of them has been pursued in controlled experimental settings, and they have not yet been examined within a systematic program of research.

At Harvard Project Zero, we and our colleagues have been investigating the aesthetic status of children's drawings and their relationship to works of art produced by adult artists. In particular, we have searched for evidence that the drawings of children genuinely exhibit those properties thought by connoisseurs to be central to, and defining of, works of art — properties such as expressivity, consistent style, and balanced composition. Our inquiries have begun with the scrutiny of collections of children's drawings and with "on line" observations of children drawing. But it has become clear to us that the issue of the aesthetic status of children's drawings can only be pursued in depth if, to our collection of spontaneous drawings, we add drawings made under controlled experimental conditions. And so, much of our recent work has involved efforts to assess the aesthetic status of children's drawings in situations where there is a genuine likelihood that the drawings may fail to exhibit artistry. Rather than assuming that children's works are — or are not — artistic, we have made this question the topic of our research.

It may be useful to trace the steps whereby we arrived at this approach. In our preliminary observations, we noted that children's drawings appear to follow a U-shaped pattern of development with respect to their aesthetic qualities. Preschool children produce drawings that are spirited, original, and aesthetically appealing, drawings that are indeed worth a second look. The child at this age is unconcerned with realistic representation, and his works often bear a striking resemblance to the works of adult contemporary artists (Figure 1). Elementary school children draw less frequently than do preschool children. And when they do draw, their works are much more predictable, more conventional, more realistic, and altogether less striking and original than those of preschoolers. Children of this age want to master the graphic conventions of their culture, and in the West this leads to an interest in the conventions of realistic representation (e.g., perspective, shading, naturalistic use of color, neatness and accuracy). In their obsessions with mastering the rules of representation, children in the middle childhood years produce works that, while more "correct" than preschool drawings, often appear less aesthetically pleasing: by their very conventionality, they have become ordinary. While the drawing of a 4 year old might resemble a Picasso sketch, the drawing of a 2 year old would rarely call to mind such a comparison.

Only a few individuals emerge from this conventional stage — those who go on, as adults, to become artists. The adult artist, having already mastered the conventions of drawing during late childhood and adolescence, may now

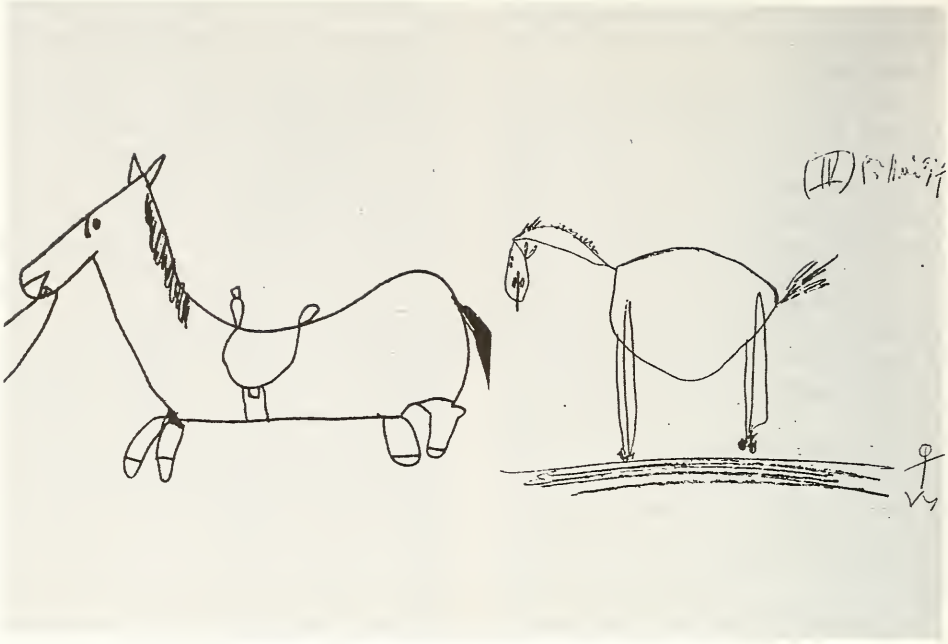

Figure 1. Left: Drawing by a preschool child.
Right: Drawing by Pablo Picasso.

begin to violate these conventions. And, in so doing, he produces works that, at least in our era, bear an uncanny resemblance to the works of the preschooler.

The striking similarity between the drawings of the preschooler and the adult artist has led us to ask whether this similarity is superficial or deep. We have asked whether various aesthetic aspects of the child's work are intentionally produced, or whether they are better viewed as "happy accidents" which the child could not repeat at will. To answer such a question, one cannot simply scrutinize spontaneously produced drawings. Rather, experimental interventions are necessary. In what follows, we describe several experiments motivated by the observation of the similarity between the art of the child and the art of the adult master.

We first took a closer look at the apparent decline in aesthetic appeal in children's drawings during the elementary school years. Has the child who has entered the "conventional" stage of drawing actually lost the ability to create the kinds of striking drawings made a few years earlier? Or has he retained this ability, but simply chosen to draw differently? Can the literal age child, who ordinarily creates careful, accurate, highly conventional drawings with minimal expressivity still create the less realistic, freer, more original type of drawing produced so effortlessly in the preschool years (Fig. 1)? Or is this early freedom lost to the elementary school aged child?

In an attempt to answer this question, we studied a group of 9 and 10 year olds at the "heights of conventionalism" (Winner, Mendelsohn, Barron and Gardner, 1980). We asked these children to make a drawing and did not stipulate what it had to be. We then showed them several drawings by preschoolers. We did not tell the children that these were preschool drawings, but simply said, "I want you to look at some drawings that somebody

else did." We asked the children to look very carefully at these drawings, because after a while we intended to take these drawings away and ask them to make a new drawing just the way "this other person would have done it." Thus, if the child had initially drawn a house, we asked him to draw another house, but this time, to draw it in the style of the preschool models. After we had collected all the drawings, they were scored by two "blind" judges along a number of dimensions, such as overall unity, balance, fluidity, originality, realism, and "appeal."

The findings of this study were remarkably clear. The elementary school children were indeed able to capture certain aspects of the preschool drawings, but only the most superficial ones. Their drawings failed to exhibit fluidity, unity, originality, and aesthetic appeal. Figure 2 illustrates a typical response. On the left is the child's initial drawing, an interior scene with a table and a window. The picture is rather carefully drawn, and one can see that the child has begun to master the rules of perspective. On the right is the same scene drawn after having seen the preschool models. Perhaps the first thing to notice is that the child's second picture is messier. The messiness of preschool drawings seems to be the most noticeable aspect to elementary school children. In fact, our subjects often said, "I'm making this messy on purpose. I know how to draw right, but I'm doing this to make it look like those others." Another thing to notice is that in the child's second drawing, the form of the window is distorted. Presumably this is because he is trying draw less realistically, a quality which he notices in the preschool models. However, in the process, the picture loses its overall unity and balance.

Another common solution was to capture not the messiness but the nonrealistic aspect of preschool works. Many children simply altered this one aspect of their drawings, superimposing it on the rest of an otherwise unaltered picture. Thus, one child changed his initial standard brown house to a house with a fanciful design on its facade; another child altered the smooth lines of a car so that the contours became unrealistically jagged.

Perhaps, one might argue, the children in our experiment realized that they were being asked to draw like younger children. If so, perhaps their preconceptions about younger children intruded. That is, 10 year olds certainly know that younger children are messier and less skillful. Thus, instead of really observing how the preschool drawings were constructed, 10 year olds may have simply drawn according to their preconceptions about

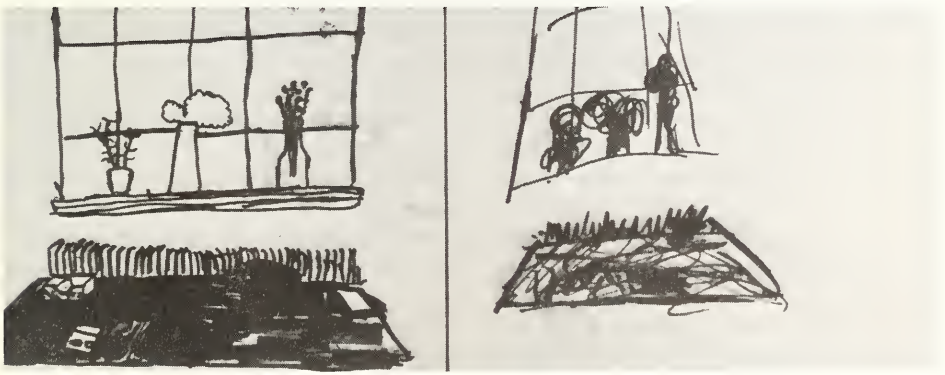

Figure 2. Left: Spontaneous drawing by 10 year old.
Right: Drawing by same child after viewing preschool models.

how preschool children draw. However, the children were also shown pictures by adult artists such as Miro, Klée, and Picasso, and were asked to redraw their initial drawings in these styles. Very similar results were obtained from this condition. While the children did not see these pictures as messy, they saw them as unrealistic. In fact, their lack of realism was their most salient property. Thus, the children altered their spontaneous drawings in just this way. For instance, one child who had originally drawn a brown dog altered his drawing by making a red and yellow dog. Nothing else, however, was changed. While he had captured the non-naturalistic quality of contemporary art, he had failed to capture its "flavor" and appeal.

Thus, it appears as if children in the literal stage have actually lost the ability to do what they so effortlessly did a few years ago. They can recapture only superficial aspects of preschool art. Their drawings remain rigid and stylized. To be sure, we cannot prove that the ability to draw freely and expressively is lost. Perhaps we should have directly pointed out the aspects of the preschool works to attend to: their fluidity, their unusual use of color, etc. However, within the confines of our task, we were unable to elicit drawings that had the charm and the originality of the preschool child's drawings. None of the elicited drawings in the style of the preschool child would ever be confused either with actual preschool drawings or with works of adult artists.

But just what is this gift that is lost? To what extent are preschool children in control of this gift, and to what extent are their works simply "happy accidents?" This brings us to a second question raised by the existence of the U-shaped curve: what is the relationship between preschool art and later mastery? U-shaped curves have been found in a number of domains [e.g., language (Bowerman, 1979); problem-solving (Richards and Siegler, 1979; Stavy, Strauss, Orpaz, and Carmi, 1979); metaphor (Gardner and Winner, 1979); and face recognition (Carey, 1979)]. In each of these cases, investigators have reported an early high performance followed by a decline and a subsequent return to the initial high performance. However, in none of these cases can the two high points of the curve be equated without intensive investigation. Even though the performances at the two high points appear similar, equivalent performances may well be the product of very different underlying processes.

We have been trying to determine the relationship between works produced at the two high points of the U-shaped curve. To pose this question is, in fact, to pose the question hinted at above: to what extent are children's drawings works of art? To answer this question, one needs some criteria by which to determine whether something is or is not a work of art.

The attempt to discover a set of criteria which distinguish art from non-art has had a long and vexed philosophical history. Definitions have often been conflated with value, thus excluding bad art from the domain of art. Or they have proved too general, including non-aesthetic as well as aesthetic objects under their rubric. For instance, defining art as "harmonious form" would force us to include much of nature within the realm of art; and defining art as "self expression" would necessitate including as art direct expressions of emotion, such as a shout of anger or a peal of laughter. However, recently, considerable progress has been made in terms of describing properties that are central to works of art, and that are neither too general nor too value laden. In what follows, we will consider three such properties: *repleteness, expression,* and *balance,* each of which tends to be

found in adult works of art. The question we will ask is: Can these properties be found in the graphic output of the very young child?

Repleteness

According to the philosopher Nelson Goodman (1968), works of art function symbolically as do many non-aesthetic objects such as maps, traffic lights and names. No inherent properties distinguish aesthetic from non-aesthetic symbols: the same symbol can function in or out of the arts. But when a symbol is functioning as a work of art, it typically takes on several characteristics. One of these is *repleteness*.

To illustrate, imagine a zig-zag line. Told that this is a line from an electrocardiograph, we attend simply to the relative dips and peaks of the line. Accurate and full reading of this symbol demands that we attend to nothing else. However, Goodman asks us to now consider this line as the outline of a mountain in a pen and ink landscape drawing. Immediately, many other properties of the line catch our attention. Now what becomes important to notice is not only the contour described by the line, but also all of its other physical qualities — the minutest variation in its width, its texture, its color or lack of color. Thus, when producing and reading a line as an aesthetic symbol, many more of its properties become relevant. Because more of its properties become relevant when the line functions aesthetically, it is called *relatively replete*.

Do children's drawings possess this property? When children vary the thickness of their lines, is this done intentionally? Do they realize that the physical properties of the line are important to note, that they are part of the meaning of the drawing just as much as what the line represents?

In order to answer the question, it does not suffice simply to look at spontaneously produced drawings: there is no way to know whether such properties as variations in line quality were placed there deliberately or accidentally. Thus, some experimental intervention is called for. Carothers and Gardner (1979) designed pairs of drawings identical in representational content but differing in line quality. For instance, in one picture the lines were thick and dark and the shading was achieved by horizontal "bar" lines. In the contrasting picture, the lines were thin and light and the shading was effected through cross-hatched lines.[1] Each drawing had a blank space on the right, and 7, 10, and 12 year olds were asked to add a person in this space "the way that the child that did the drawing would have finished it." Children were shown the two members of a pair together so that the contrast between them would be evident. "If you see any difference between the two drawings," they were told, "try to make your drawings differ in the same way." Two different types of pairs, varying according to different properties of line, were used.

If children are sensitive to the property of repleteness, then they should realize the properties of the line matter. Thus, they should complete each drawing using the same line quality as in the rest of the drawing. Of course it is possible that they might perceive the difference, and even recognize its importance, but yet be unable to produce it. Thus, after children had made a completion for each member of a pair, one picture was taken away and two possible completions were presented. Children were asked to pick the one completion that they thought was done by the same person who drew the picture.

The results of this study were very clear-cut. Seven year olds demonstrated little sensitivity to repleteness in either the production or the perception tasks. Figure 3 shows two completions by a 7 year old. Their line quality is identical, yet the one on the left was a completion

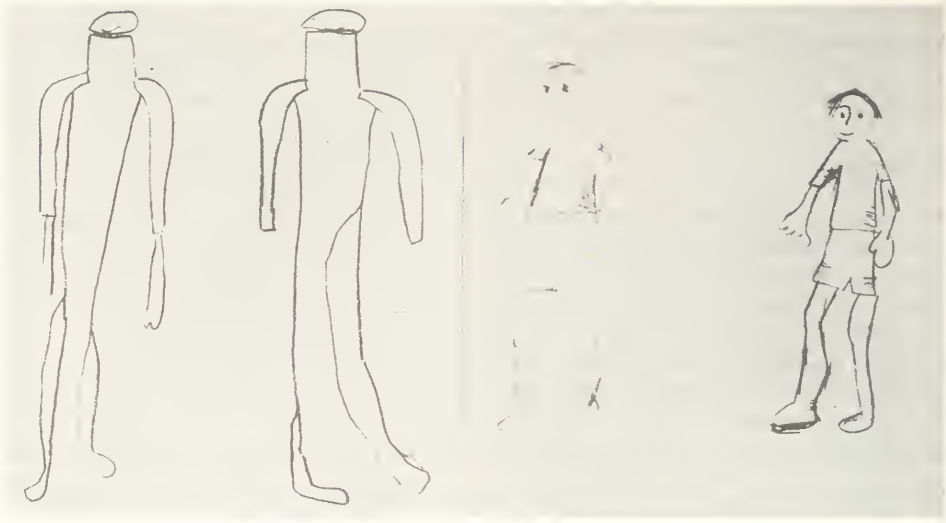

Figure 3. Left: Seven year old's completions for repleteness task.
Note identical line quality.
Right: Twelve year old's completions for repleteness task.
Note different line quality.

of the picture with light lines, and the one on the right was a completion of the picture with dark lines. And on one of the perception tasks administered, 7 year olds chose randomly.

Ten year olds were able to perform at a high level on the perception tasks, but were just beginning to be able to succeed on the production tasks. Twelve year olds, on the other hand, could not only perceive repleteness but could also produce it. Figure 3 shows two completions by a 12 year old: as can be clearly seen, the line qualities of these two completions are qualitatively different.

After the experiment was over, the experimenter discussed the task with each child. These discussions revealed that, when told to search for differences between the two pictures, 7 year olds sought differences such as an extra finger, or a shoe in one but not in the other picture. Finding no such differences, and blind to the difference in line quality, these children proceeded to produce identical completions and to often choose randomly on the multiple choice tests. This study suggests that between the ages of 7 and 12 years, drawings are transformed in their very nature. They are transformed from non-aesthetic to aesthetic symbols.

Expression

Goodman (1968) makes a distinction between several kinds of symbolization. One type is denotation, through which a symbol refers to something in the world. Denotation is a form of symbolization widely used both in and out of the arts: maps denote; names denote; and in the arts, representational paintings denote. (Graphic representation is a form of denotation.) However, while denotation is a common property of the arts, it is not a necessary one: music rarely denotes; neither does a Mondrian painting. But this does not mean that these works are not symbolic. Rather than symbolizing through denotation, these works symbolize through expression. For instance, an abstract painting expresses moods and non-visual sensory properties. A mood of sadness, at least in our culture, is often expressed by the use of dark

colors and droopy lines, gaiety by bright colors and sprightly lines, loudness by jagged lines or bright colors. In these cases, the means of conveying is metaphorical. While a painting may be literally blue, it is only metaphorically sad or loud. Because all works of art express but only some denote, expression can be said to be a mode of symbolization more central to the arts than denotation.

To investigate when children become able to deliberately manipulate line, color, and form to metaphorically convey non-visual properties, we carried out several studies. In the first of these, using the same paradigm as in the repleteness study described above, 7, 10, and 12 year olds were shown a pair of drawings similar in representational content but different in expressed mood (Carothers and Gardner, 1979). The "sad" picture displayed a man on a cloudy, cold day walking past a closed store. The contrasting "happy" picture displayed a man on a sunny day walking past an open, welcoming store.[2] On the right of each page there was again a blank space in which children were asked to draw a tree and some flowers. As in the repleteness study, children were shown both members of a pair together so that the contrast between them would be evident.

We asked children to draw a tree rather than, for example, a person, because we wanted to elicit an expressive rather than a denotational solution. If children had added a person, they might well have drawn a smiling or a frowning face. This would constitute denoting a sad person but not expressing sadness metaphorically. As in the repleteness task, after the children had finished their own drawings, they were given a multiple choice test. The "sad" picture was removed and children were asked to select one of two completions for the happy picture — a drooping, leafless tree (incorrect) or an upright tree teeming with leaves and blooming flowers (correct).

The results were very similar to those obtained in the study of sensitivity to repleteness. Seven year olds were not able to produce expressively sad or happy pictures. As can be seen in Figure 4, their completions for the two contrasting members of the pair did not differ. And on the multiple choice task they chose randomly. When they did happen to choose correctly, and when they were questioned as to this choice,

Figure 4. Left: Seven year old's completions for expression task.
Note the lack of difference between them.
Right: Twelve year old's completions for expression task.
Barren, gnarled tree with wilted flowers completes the "sad" picture (right);
blooming tree and flowers complete the "happy" picture (left).

they said, "I chose this because it's drawn better," or "because it looks more like a tree." Never did they say they chose it because it looked happier. Ten year olds had no difficulty with the multiple choice test, but were only just beginning to be able to perform successfully on the production test: half were able to distinguish their two completions appropriately. Twelve year olds succeeded on both tasks. Figure 4 shows a 12 year old's solution to the task.

One might argue, perhaps, that this task is too indirect. Perhaps children are capable of expressing moods, but the subjects in our experiment did not realize that this was what was being asked of them. With this in mind, one of our colleagues (Ives, 1980) simply asked children directly to draw a happy tree and a sad tree. He also asked them to convey non-visual sensory properties by drawing a quiet tree and a loud tree. He found that when asked in this direct manner, even 4 year olds could sometimes achieve expressive solutions; but they were much more likely to do so for the non-visual sensory property of quiet and loud than they were for the emotional properties happy and sad.

Figure 5 shows a metaphorical solution to the quiet and loud tree task. Here the child has used size to convey auditory volume. While children were occasionally able to express auditory properties by finding their metaphorical visual analogue, when asked to express moods they almost always invented a representational solution, drawing happy or sad faces on the tree. The vast majority of pre-school solutions to the loud-quiet task were also representational rather than expressive (e.g., shouting faces or musical notes to convey loudness). After the age of 5, representational solutions steadily declined and expressive solutions steadily rose.

In another study carried out in our laboratory, we studied children even younger than 4 (Scarlett, Fucigna, Finkelstein, 1980). In this study, children between the ages of 18 months and 5 years were asked to make a "scary house." The earliest solutions to this task revealed that very young children (under 5) failed to respect the boundary

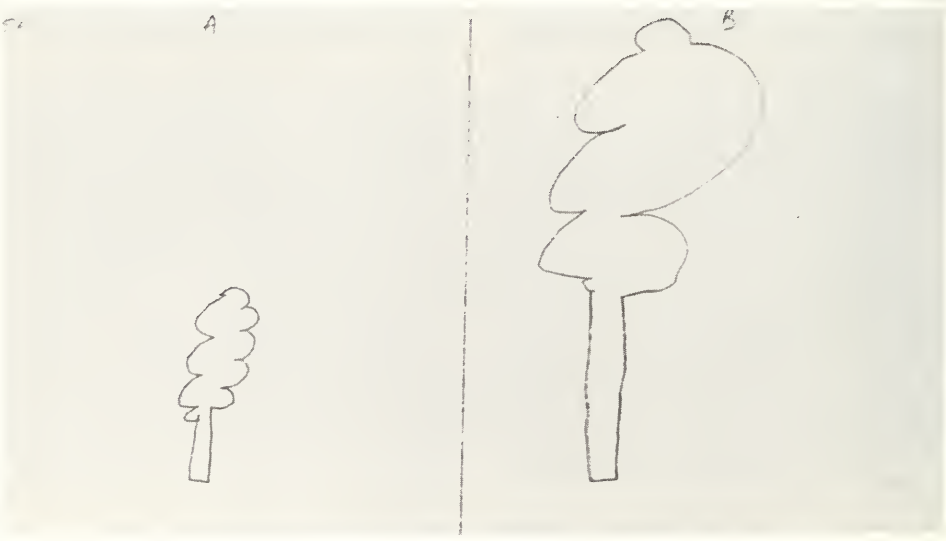

Figure 5. Four year old's "quiet" tree (left) and "loud" tree (right). Note the expressive solution.

between themselves and their drawings. Thus, they sometimes drew a standard house, simultaneously growling at the experimenter in order to scare him. These children failed to respect the rules of the visual medium and introduced non-visual means of expression.

Thus, it appears that when asked to express a mood or a non-visual property in a drawing, children first do so with their own bodies rather than through their drawings. They then adopt a representational solution, indicating that they have confused expression with denotation. But in the late preschool years they begin to express metaphorically in their drawings. Sensitivity to expressivity, thus, seems to emerge somewhat earlier than sensitivity to repleteness. This may be because expressivity is a more direct manifestation of the child's own emotional state. Moreover, the medium of drawing may lend itself more directly to expression than to repleteness. Expression is, in brief, a less analytic aspect of the arts: to achieve repleteness, one requires more of a detached, studied attitude vis-a-vis the medium than is called for in order to achieve expression.

Balance

A third property of works of art, one stressed by Rudolf Arnheim (1974), is balance.[3] A graphic composition may be organized in several ways. It may, first of all, be unbalanced, with the forms and hence the weight so unevenly distributed as to create a sense of restlessness and tension. Works of art are rarely so unbalanced; occasionally, however, a contemporary artist may intentionally create an unbalanced work in order to convey tension.

Balanced compositions may be organized in a number of different ways. They may be balanced by an even and uniform distribution of forms across the page, as in a checkerboard pattern. They may be balanced through a symmetrical arrangement of forms, so that, sliced along one or more axes, the picture divides into mirror images. And finally, pictures may be balanced through a dynamic, asymmetrical organization of forms (Arnheim, 1974). For instance, a large form may be adequately off-set by a much smaller form, if the smaller form is painted a brighter hue. A sense of balance can thus be created because brightness makes forms appear larger and thus heavier. Or, to cite another example of dynamic balance, several forms grouped closely together on the right side of the page may be balanced by just one of these same forms to their left if that one form is isolated, because isolation lends the appearance of greater weight.

We asked whether children do in fact balance their drawings, and if so, what type of spatial rules they use in order to achieve balance. Four, six, and ten year old children were given a series of more and less structured drawing tasks. We also gave them a preference task in order to determine the type of spatial arrangements preferred at different ages.

Spontaneous and completion tasks. Children were first asked to draw two pictures: a scene (house, tree, and some birds) and a design (the Spontaneous Task). Next they were asked to complete a series of both representational and nonrepresentational unbalanced drawings (the Completion Task). Drawings were scored as either unbalanced; balanced through filling in all the space; balanced through symmetry; or balanced through a dynamic, asymmetrical arrangement.

We expected that balanced drawings would increase in frequency with age. However, contrary to prediction, for both Spontaneous and Completion Tasks (and for both representational and nonrepresentational drawings), balanced compositions exceeded unbalanced ones at all ages. Thus, 4

year olds proved just as likely to balance their pictures as did older children.

With respect to the type of balance achieved at different ages, we expected symmetrical solutions to give way to dynamic ones, since the latter seem more difficult to achieve. This expectation was not fulfilled, however. While symmetrical solutions did increase with age, replacing the frequent 4 year olds' solution of filling in all the space, no shift was found in the use of dynamic balance. At all ages, about a quarter of the drawings produced were dynamically balanced.

But is there really no difference between the 4 year old's dynamically balanced organization and that of the 10 year old? It seems to us that there may be an important difference. It seems quite possible (although it remains unproven) that the 4 year old achieves dynamic balance accidentally. Although it is difficult to achieve symmetry by accident, it is much more possible to achieve dynamic balance unintentionally, since its rules are more flexible. It is our best guess that the preschoolers are striving for symmetry; failing, due to technical limitations, they often achieve dynamic balance instead. One piece of evidence in support of this speculation comes from the preference task, to be discussed below, in which 4 year olds revealed less attraction to dynamic balance than did older children.

Copy tasks. Children were next asked to copy unbalanced pictures. We wanted to know whether there was a tendency to correct an unbalanced model by making the copy more balanced than the model. Here, striking results were obtained. Of all ages studied, 4 year olds were most likely to increase the balance of the model. While they did not really adhere to the task of faithfully copying, they did produce a more balanced picture than the model. Six year olds revealed an opposing tendency. They decreased the model's balance, squeezing the forms even further over to the left. Ten year olds faithfully copied the model, maintaining the same degree of lack of balance in their copies. However, when they did fail to copy accurately, their mistakes were always in the direction of greater balance. These results suggest that in 4 year olds, the tendency to balance is stronger than the ability to copy faithfully. Six year olds, in attempting to conteract this tendency, lean too far in the opposite direction. By the age of 10, the tendency to balance is outweighed by the ability to adhere to the task.

Preference task. Finally, children were asked to choose their favorite picture, given a choice of four: symmetrically balanced, dynamically balanced, unbalanced — too heavy on the right, and unbalanced — too heavy on the left. All ages preferred balanced to unbalanced pictures, and symmetrical to dynamic balance. The findings of the preference task revealed that children like certain types of balance before they can produce these types themselves. While 4 year olds produced fewer symmetrical pictures than did older children, they preferred symmetry as strongly as did older children; and while older children did not produce a greater number of dynamically balanced pictures than younger children, they preferred this type of balance more often than their younger counterparts. If preference does indeed precede production, one would expect even older children to begin to produce more dynamically balanced drawings. We are now looking at the drawings of older children and adults, and our preliminary results support such a prediction.

Conclusion

We began our consideration of the aesthetic aspects of children's drawings by noting certain similarities between preschool and adult graphic works.

To determine whether these similarities were simply superficial, we investigated the extent to which preschool works possess properties characteristically found in adult works of art. This led us to investigate three properties: repleteness, expression, and balance. It should be noted that these properties are characteristic of all types of art, not just those twentieth century works that happen to bear a resemblance to preschool works. Therefore, our investigation in no way rests on the existence of a similarity between preschool and adult art, although this similarity stimulated the question motivating this study.

Our studies suggest the following tentative conclusions. Even though preschool drawings look like adult works of art, and even though they could be slipped into an exhibit of contemporary art and passed off as adult works, they are produced by very different underlying processes. The preschooler is not in control of the property of repleteness. He does not realize that all of the details matter, that all are relevant. Sensitivity to repleteness increases linearly with age. This is somewhat of a paradox. At the preschool age, when children's drawings appear aesthetic, children are not sensitive to repleteness; and at the elementary school age, when children's drawings appear less aesthetic, children are becoming increasingly sensitive to repleteness.

A similar paradox obtains with expression. The ability to convey moods metaphorically increases steadily with age, even though it appears as if "conventional stage" children have lost this ability in their spontaneous works. Thus, contrary to our initial study in which elementary school children were asked to draw like preschool children and failed to recapture the flavor of preschool drawings, here is another line of evidence that older children have not lost but are steadily gaining. The paradox is that, while preschool drawings appear more expressive than "conventional stage" drawings, it is the 10 year olds who are in control of this property while the preschoolers are not. Thus, in these two cases, elementary school children have skills that they are not putting to use in their spontaneous works. And preschool age children appear to have a skill that they in fact do not have.

As for balance, the story is somewhat different. Clearly, preschool children prefer balance to unbalance, and will go to great lengths to balance their pictures, even if it means incorrectly copying a model. But the fact that even when directly copying an unbalanced picture they produce a balanced one, suggests that the 4 year old is not really in control of balance: rather, balance seems to be in control of the child. Thus, unlike the adult artist, the preschool child may well be unable to choose to produce an unbalanced picture in order to express tension, for example.

Thus, although preschool works bear an uncanny resemblance to certain twentieth century masters, these two bodies of work are really very different. Of course, this does not mean that preschool drawings should be excluded *in toto* from the realm of "art." No sharp boundary between art and non-art can be drawn. What we maintain here is that preschool works tend to possess fewer of those properties that are characteristic of adult works of art. However, it remains possible that preschool children do in fact genuinely produce replete and expressive drawings, but, when given an experimental task, they fail to understand what is expected of them and thus their performance deteriorates. The extent to which the present results are task-dependent remains to be determined.

Despite the probable differences between preschool and adult art, there may yet be a special kinship between

the child artist and the adult artist. This kinship may take several forms. Four year olds resemble adult artists: in their willingness to violate norms, in the intensity with which they go about the task of drawing, in their willingness to explore for hours at a time, and in their inventiveness and playfulness with the medium. Moreover, these modes of behavior do not seem to be entirely unconscious: young children appear to be delighted with their playful attitude and to value adult reactions to their violations of graphic norms. And perhaps there is a reason for this difference between the child and the artist on the one hand, and the rest of us on the other. Whereas most of us, with age, come increasingly to rely on verbal language to express ourselves, and thereby to abjure nonverbal symbol systems, the child and the adult artist are working out themes that they either cannot deal with — or choose not to deal with — in the "normal" symbol system. Some of these themes are conceptual (e.g., the nature of spatial relations) and some are affective (e.g., aggression, conflict, tension). Paradoxically, it is to this selective inarticulateness that all lovers of art are in debt.

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Footnotes

1. Stimuli used are reproduced in Carothers and Gardner (1979).

2. Stimuli used are reproduced in Carothers and Gardner (1979).

3. While Arnheim has written a great deal about balance in works of art, he has not attempted to make the argument that the presence of balance distinguishes art from non-art. In fact, he argues that no such distinction between art and non-art ought to be made (Arnheim, personal communication). However, we have taken the property of balance which he stresses and have used it in our own theoretical framework in our attempt to determine the relationship between preschool and adult art.

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RESPONSE TO WINNER AND GARDNER

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In their paper Ellen Winner and Howard Gardner have indeed marked the boundaries of an important area of inquiry into children's drawings. Their questions relating to the artistic and aesthetic status of the graphic work of young people have generally been ignored by psychologists and art educators alike. But of course when one inquires into the aesthetic and artistic, one has entered the domain of the philosopher and historian of art as well. It is upon this ground that Winner and Gardner must be criticized.

First let us attend to some historical facts. Winner and Gardner point to similarities in a child's easel paintings and a painting by Helen Frankenthaler as evidence of the possible heights of artistry achieved by preschool children. But of course it is only in the century of abstract expressionism that we would note such a superficial similarity. The child's non-representational works bear little resemblance to Giotto, Leonardo, Rembrandt or even today's Richard Estes. The similarity seems nothing more than a mere and passing coincidence in the history of art. Furthermore, when the works are presented in nearly equivalent postage stamp sizes and in black and white reproduction, they bear only a few of the qualitative, technical and stylistic differences that we would see if we were to compare Frankenthaler's eight or ten foot canvases with the child's tempera paintings on 18 x 24 inch newsprint paper.

These comparisons are important because much of the weight of Winner's and Gardner's argument for viewing graphic development as a U-shaped curve lies in the contention that an artistic height has been achieved by the pre-schooler in art-like productions that are viewed as expressive, spontaneous and inventive. When these features diminish (if indeed they do) in the graphic productions of older children, these works are said to have "less aesthetic appeal," may also signal an actual loss of ability to create the "striking drawings made a few years earlier." At this point we might ask, are the proper questions being asked, and has a proper factual and philosophical foundation been prepared?

The philosophical position in which Winner and Gardner ground their inquiry is that of Nelson Goodman. Goodman has seen the futility of answering the question "what is art?" observing the more appropriate question to be "when is art?" For Goodman art is when *repleteness* and *expression* occur to which Winner and Gardner add *balance*. When a production has these features, apparently it has the basic attributes for qualification as art. Of course it may still not be considered art. Winner's and Gardner's older subjects could reproduce these features, and yet what they produced could certainly not be considered an occasion for art.

Art is a conventional classification, or better, a series of classifications — tribal art, Renaissance art, classical art, folk art, comic art, advertising art and, yes, even child art. Furthermore, a look at the history of art reveals how artifacts, which once neither fit into particular conventional classifications nor were considered to be art at all, have, through changes in perceiver's attitudes or in provenance of the work,

acquired a new or different artistic status; mere illustrations have become prized paintings, ritual objects have become exquisite sculptures. Artists, too, can alter their works in order to move them from one classification to another. Thus through changes in the handling of media or subject matter, the illustrator becomes the fine artist-painter. Holding to our idea of classifications, we may also observe the preschool child artist becoming the middle childhood artist and then the adolescent illustrator, cartoonist, and occasionally even the adolescent painter. In short, art is not just one thing; it is lots of things, and what Winner and Gardner have observed without fully stating it is that sometime around the age of 10 children are able developmentally to produce two of the symptoms of a few kinds of essentially adult types of art.

But what of the graphic productions of the preschooler to which Winner and Gardner attribute so much — using words such as: "inventiveness," "playfulness," "violation of norms," "unpredictability," "unconventional," "spirited," "original," and "aesthetically appealing"? Surely some of these adjectives apply, but others seem to indicate a misunderstanding of the developmental conditions under which the preschool child produces graphic work. They see preschool productions as less predictable and conventional than those of older children. Yet the early productions are surely the most predictable because, as Winner and Gardner say of balance, "the 4 year old is not really in control of balance: rather, balance seems to be in control of the child," likewise, the young child is the most highly biased of all graphic producers — biased to make the simplest forms possible, to order forms at right angles, to fulfull the intrinsic demands of a particular format, etc. Thus their work is the most utterly predictable of all graphic productions! And to call the productions of preschoolers unconventional is at best a misnomer. Winner and Gardner characterize the graphic agenda of middle childhood to be one of acquiring conventions; therefore, it is reasonable to assume that preschoolers do not possess these conventions. Preschool work may be somewhat *preconventional* when considered in light of adult graphic conventions; to be *unconventional* in the artistic sense is to have acquired conventions and then to have broken them. Preschoolers surely cannot break conventions that they are not yet able to produce.

Other qualities of the graphic productions of preschoolers may also be attributed to somewhat erratic motor control and to their ability to be satisfied with configurations that conform only vaguely to some exterior graphic production model.

I see little evidence for the claim for the existence of the U-shaped developmental curve in graphic production. Perhaps with more inquiry some few aspects of graphic competence may be found to decline for a period of time. Nevertheless, the evidence from the National Assessment of Educational Progress and from Winner and Gardner's inquiry is that the highly complex matter of graphic development is a steady process. The fact that Winner and Gardner might even consider that the productions of five year olds have more artistry than those of ten year olds seems to reveal more about the inquirer's aesthetic tastes in art than the facts of graphic development. My taste is for middle childhood and adolescent art. Perhaps that is why I have a bias against the U-curve.

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RESPONSE TO WINNER AND GARDNER

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The following thoughts are written in response to "The Art in Children's Drawings," an outline of a paper presented by Howard Gardner and Ellen Winner at the Symposium on Representation and Metaphor. The relevance of these thoughts may vary to the extent that Gardner and Winner's paper actually reflects their outline and presentation of it.

According to Gardner and Winner's outline, their paper focuses on two issues: Is there a regular progression in the development of children's art? and What is the relationship between children's art and the art of contemporary adult artists?

The present discussion will focus on the question of progress in children's art. First, because children's artistic progress is central to art education. Second, because, as I will try to point out, the relationship of children's art to adults' art is implicit to Gardner and Winner's concept of development in art. Consequently, it is not an issue that they have effectively separated from the interpretation of their developmental data.

In the outline of their paper, Gardner and Winner assert that there is "considerable evidence to document a regular progression in the development of graphic art. Moreover, the progression follows a U-shape curve." They explain that the drawings of preschoolers, which appear highly expressive and original, possess a charm and aesthetic appeal indicative of artistic ability, while the drawings of older elementary school children, which are conventional and predictable, possess less charm and aesthetic appeal indicating a decline in artistic ability. In the presentation, a selection of slides were shown to demonstrate that the ability to produce aesthetically appealing drawings reappears only in adults who go on to become professional artists.

In developmental psychology, Gardner and Winner's finding of a U-shape progression suggests remarkable and highly significant results. This is because, as T. G. R. Bower (1979, p. 303) has observed, "the belief that behavioral growth is a continuous process with the child necessarily getting better and better at any task as he grows, is the foundation for a great deal of effort in developmental psychology. . . . indeed, the whole concept of I.Q. depends upon the assumption."

Piaget's theory of intellectual development certainly describes a process in which cognitive abilities occur in sequentially fixed stages toward the direction of highest order. Moreover, there is general agreement among psychologists that Piaget's highest order, end-state of cognitive development is perhaps a genetic epistemologist, or if not, at least a western-trained scientist. And, in spite of the problems of cultural bias inherent in any concept of a psychological end-state, the notion of an end-state is generally regarded as a logical necessity for determining progress.

Gardner and Winner's research appears to be based on a Piagetian model of cognitive development. Consistent with that model, they maintain an implicit concept of the highest order of artistic development. For Gardner and Winner, the end-state of artistic development appears to be Abstract Expressionism.

Abstract Expressionism can be iden-

tified as Gardner and Winner's end-state for artistic development on the basis of their interpretation of the formal properties of "expressivity" and "charm" which characterize the drawings possessing "aesthetic appeal." These properties correspond in superficial appearance to the properties of selected adult work. The selected adult work conforms to the style of Abstract Expressionism.

The appearance of specific formal properties are taken by Gardner and Winner to indicate artistic ability, while the absence of these properties is taken to indicate inability, in spite of the fact that there are other properties present which might be interpreted to indicate a different aesthetic appeal, and certainly another artistic ability. Because these specific formal properties appear in the early gestural drawings of young children, and not in the constructionist drawings of older children, Gardner and Winner reason that it must be because of a decline in artistic ability, that may never be regained. Clearly, it is their reasoning which leads to such remarkable results.

If Gardner and Winner had interpreted their data differently, they might, as Bower (1979) did, reconsider the concept of development itself. In the science of psychology, experimental results are often used to confirm or refute a theoretical belief. Results contrary to important theoretical beliefs are usually interpreted to have methodological problems or to be anomalous.

Or, had Gardner and Winner identified a different style of art as the end-state of artistic development, they would have obtained different data. Indeed, because children's performances in art are so generally predictable to art-educators, many might predict, for example, that if one held Color-Field as the end-state of artistic development, then two and three year olds would demonstrate "artistic ability," while the representational drawing of older children would indicate a "decline." Or, if one held Pop-Art to be the highest order of artistic development, the drawings of ten year olds would indicate "ability" and drawings possessing different properties, say calligraphic line quality, would indicate "less ability."

The point is this: a developmental psychologist could have derived alternative interpretations from the same data; or used the same tasks to generate entirely different data. Since one of the rules for evidence in the science of psychology requires that a set of data possess the ability to confirm certain theoretical beliefs and resist alternative, conflicting interpretation, it is unlikely that either psychologists or educators will concur with Gardner and Winner's claim that they have considerable evidence to document a U-shape progression in the development of artistic ability.

There are several questions raised for art educators by the research of Gardner and Winner; What theory has been tested? What new knowledge has been gained? What insights do we have about children, art, or developmental psychology that we did not previously have?

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REPRESENTATION AND REALITY: THE ORIGINS AND DETERMINANTS OF YOUNG CHILDREN'S DRAWINGS

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I would like to address three distinct though related issues that are at the heart of our understanding of child art: What are the origins and antecedents of the early representational forms, for example, of the tadpole figures? More specifically, do we accept the developmental patterns outlined by Rhoda Kellogg who delineates a necessary, perhaps even inevitable progression from scribble forms to placement patterns, to emergent shapes, to diagrams and, finally, to multiples of combines and aggregates?

A second and related question concerns the determinants of early representational figures. Are these figures non-pictorial in intent, as Rhoda Kellogg claims, and a natural elaboration of earlier practiced patterns, or do they represent the child's best efforts to capture a *likeness* to the visual world? What animate and inanimate models does the preschool child develop? Are these models graphically differentiated, and if so, how?

The third question addresses an old issue, namely, that of the cognitive deficiency of the young child's drawing. The notion that child art is merely a special case of conceptual immaturity, typical of the mental functions of young children, has received much attention. In an earlier version, Luquet and Piaget evoked the concept of "synthetic incapacity" to explain the childish drawings and their peculiarities. More recently, it has become fashionable to analyze the drawings as performance errors and Norman Freeman has reformulated the problem in terms of "production" deficits.

These three questions focus on basic representational issues, namely, on the origins of representational activity in drawing, the transition from pre-representational action to symbolization, the evolution of the first representational forms, and the determinants of early graphic models. For didactic purposes I have dealt with these questions separately, and explored them in several empirical studies.

Our first question concerns the antecedents of representational graphic activity. Rhoda Kellogg (1969) has devoted herself to this issue and formulated an interesting thesis. She perceives the scribbles and scribble-pattern formations that children tend to produce between the ages of two and three years as crucial antecedents, as necessary elements in the graphic vocabulary that children evolve. She has catalogued the scribbles into 20 basic ones, which form the units for the next phase when children use various outline figures or crossed line patterns labeled "diagrams"; next, the child combines these six units (diagrams) into more complex ones called "combines," and she eventually reaches a combinatorial stage of "aggregates" that provide the means for the creation of figures, devoid as yet of pictorial likeness to real objects, but able

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Additional unpublished graphic materials supporting this research are available from the editorial office of the Review of Research in Visual Arts Education.

to represent them in some fashion. According to Rhoda Kellogg the ability to make shapes can be seen in the child's earliest scribble-formations, which need to be exercised until eye-control combines, alters, and recombines the forms. It is an autonomous process, innately determined, and independent of the impact of the visual world. It is a process that proceeds in a somewhat piecemeal fashion, analogous to block building, namely, from a simple form to a more complex one that combines the simple features. Thus, Kellogg considers the non-pictorial scribbles and the emergent pattern formations as the immediate precursors of the forms drawn later, when the child deliberately and intentionally represents objects. The child's earliest recognizable drawings are characterized as non-pictorial, derived from mandala and sun-schemas, and constructed quite independently of the visual characteristics of the object. To summarize Kellogg's position: Child art evolves from non-pictorial designs, unaffected by the visual attributes of the object.

Rhoda Kellogg's account raises an interesting question: Are we dealing with a truly descriptive account of a developmental phenomenon, or with an adult's imposition of her preferred taxonomy on children's drawings? Is this taxonomy developmentally meaningful, and does it clarify the *representational* origins of the drawings? The answer to this question seems to me rather negative. I think that Rudolf Arnheim's (1974) account, with his stress on preferred perceptual-motor patterns which single the circle out for special attention, has much to recommend it. The circular form bounds the inside area, which attains a solid-looking and figural quality, and thus becomes useful for representational purposes. Rudolf Arnheim sees the evolution of the clear circular outline and the single one-dimensional line as the starting points for the development of representational forms, whose graphic differentiation is prompted as well as guided by a visual *representational logic*. Almost from the very beginning there is a tension between the utilization of simple and preferred forms such as the circle and the line, and the need to do justice to the looks of the objects. The forms which the child uses to represent his first objects, are indeed forms of equivalence — they serve a symbolic function — and in some fundamental way they must do justice to the referent. If we observe the child at work and listen to his comments, we notice his discomfort when the drawing fails to meet his standards of likeness. To correct this unsatisfactory state of affairs, the child uses words to bridge the gap between what he has produced and the meaning it fails to convey, between his perception of the object and his inadequate representation thereof. We find a whole range of verbalizations designed to close the gap between perception and representation (Golomb, 1973, 1974, 1977). Indeed, verbalizations change and decline as a function of increased graphic competence, which tells us something about the child's desire to capture a likeness to the object, a finding that does not support Kellogg's account. It is interesting to note that in "Analyzing Children's Art" Rhoda Kellogg reports a very low incidence of such important precursors of the human figure as the mandala and the sun-schema: a range of only 1.6-9.6% for the mandala and an even more limited range of 2-4% for the sun-schema (p. 193). These very low numbers and the identical mean ages of 43 months (p. 192) for the first-drawn sun-schemas and the first-drawn humans do not support the notion of stage progression in this case. Finally, Dale Harris (1971), Malka Haas (1978) and Susanna Millar (1975) have each provided some evidence that children, deprived of the opportunity to use paper and pencil, seem to engage in

only limited and short-lived scribble exercises. These children appear to skip the "design" stage altogether, and within a few trials they evolve the familiar human figure representations. Dale Harris collected his data from children in the South American Andes. The earliest trials yielded a very restricted scribble repertoire, consisting only of circular whirls or loops, separately distributed over the page. The next step already produced tadpole figures. Malka Haas' collection of drawings made by Bedouins from the Sinai desert demonstrate that preschoolers and adults who had never before been exposed to paper and pencil, evolved the human figure in a few trials, and without extensive scribble or diagram explorations. Finally, Susanna Millar's work with blind children also demonstrates this ability to create forms of equivalence without previous scribble experience.

If we truly want to understand the evolution of representational abilities, we ought to turn to young children in the process of discovering graphic possibilities, i.e., to children who make the transition from scribble-forms to figural representation. With this aim in mind, we designed the following study: Linda Whitaker and I asked 250 children between the ages of 2 to 7 years for a series of drawings, beginning with two "free" drawings, merely requesting the child to draw a picture of anything she liked. Next, each participant was asked for pairs of drawings: a mommy and a baby, a giraffe and a kitten, a snake and a worm, a tree and a flower, a bird and a fish, a house and a car. The order of the presentation of the tasks was counterbalanced, and the serial position of the two items making up each pair was consistently alternated. Each child was tested individually and a complete record of his actions was obtained. Children who responded to the assigned tasks (those that requested the drawing of specific objects) with scribbles, were given several drawing-on-dictation tasks: a mommy, cat, house, and tree. The age range of our subjects included at the lower end 2 year old toddlers, clearly prerepresentational children. It was hoped that they would provide us with an insight into the questions we raised previously, namely, the origins of representational activity and its developmental course.

Analysis of the scribble-patterns produced by our 2 to 4 year olds revealed some difficulty with Kellogg's scoring criteria. A number of scribbles could not be reliably identified, for example, the decision to classify parallel vertical lines as "single" (S-2), multiple vertical (S-6) or zigzag (S-12) was frequently quite arbitrary. A similar difficulty arose with the identification of spiral lines (S-15), multiple line overlaid circle (S-16), multiple line circumference (S-17) or even circular line spread out (S-18). More serious was the finding that scoring the end product without obtaining a complete record of the drawing process led to low inter-scorer reliability. When good protocols were available, inter-scorer agreement reached 70%. However, since much scribble action was produced *without* visual attention to the paper and crayon, the value of this scoring system must be seriously questioned. Altogether, the scribble patterns obtained in our study fall into two broad categories consisting of (1) whirls, loops and circles, and (2) multiple, densely patterned parallel lines.

When we turn to the major results of our study, we find that most of the children who produced energetic and somewhat unruly scribble patterns on the free drawing tasks, evolved separately delineated contours when *specific* objects were requested. The instructions seemed to mobilize the child's efforts and elicited visually guided action. Of our 2 year old scribblers, 39% produced at least one (1) representational drawing either on-request or on-dictation, a number which

increased to 80% for our 3 year olds. These children produced "pictorials" without progressing through Kellogg's sequence of prerequisite stages. The prerepresentational child may, at times, have a varied scribble repertoire (not observed in our study); however, when he struggles to create a figure-on-request, this repertoire is not very useful. The dictation task, for example, demands on the spot solutions, and the child's graphic inventions, under the pressure of the task, shortcircuits the need for lengthy practice with scribble-patterns, implied shapes, emergent diagrams, and combines. It is a significant finding that only very few drawings in the age range of 2 to 4 years could be classified as a "design," and even diagrams were exceedingly rare, a mere 4%. However, several children drew distinct letters of the alphabet, and identified them as such.

As the foregoing analysis suggests, it seems to me that the account of the early beginnings is somewhat reversed: as the child evolves some basic graphic forms beyond the scribble patterns, as she succeeds to control the unruly scribble motions, the forms become *immediately* useful for the representation of objects, and their meaning is then determined by the whole figure. Thus, the first pictorials, as Kellogg calls them, or the first clearly recognizable representations, as I would call them, are *not* derived from earlier diagrams, combines and aggregates. It appears that the building block approach to the origins of representational art in children is not very useful, and that it tends to describe the symbolic-transformational process which child art is, as a somewhat senseless, almost mechanical process. When we examine the work of children who make the transition from scribbles to representational forms, we discover that their prime concern is with visual likeness to the object. The symbolizing tendency to link the drawing to its referent establishes graphic order, it demands graphic articulation, and it governs the process of further graphic differentiation. Forms are utilized, but they are subordinated to the demands of the task, i.e., to the meaning of the figure. This analysis is not intended to belittle the value of experimentation with the medium. On the contrary, a visual-graphic dialogue between what the crayon produces and the eye interprets is essential for representational progress. Our analysis merely emphasizes that the search for the origins of representation in the child's scribble actions is a futile pursuit.

This brings us to our second question which examines the evolution of graphic models for several animate and inanimate objects. We would like to know how graphic differentiation proceeds and how it relates to the visual characteristics of the object.

Analysis of our data indicates the impact of instructions on the drawing process. Drawing-on-request elicited in our 2 year olds a tendency, already previously mentioned, to control the unruly whirls, and to produce single, ovalish looking shapes, with the *exception* of the response to the snake and worm tasks, which produced single vertical, horizontal or diagonal lines. Humans were drawn by 22% of our 2 year old subjects, who usually composed a global circle with facial features with or without limbs. The other tasks yielded only a small number of representational figures, 5% for fish and cats, respectively, and 13% for trees and flowers.

In our 3 year old youngsters we observed a dramatic increase in the drawing of representational figures: 65% — snakes, 42% — humans, 42% — flowers and trees, 38% — cats, 23% — birds, 19% — fish, 15% — giraffes, houses and cars, respectively. The humans, cats and giraffes were represented, primarily, by a global animate tadpolish figure, which in most cases did not yet graphically differentiate

among them, although occasionally, ear markings, whiskers and diagonal necks appeared. The snake model, however, became unmistakably "snakish" with its separate head, elongated slim body and exclusively horizontal orientation. Fish were drawn with a horizontal ovalish body and sideways orientation. The graphic differentiation of birds lagged somewhat behind, but several drawings were endowed with "wings." Houses and cars were drawn, infrequently, and were marked by a tendency toward rectangular and triangular forms.

The 4 year old children appeared quite confident about their drawing ability and we rarely encountered a child who refused all tasks. Representational competence seemed to be increasing with 88% drawing humans, 81% — snakes, 77% — birds, 65% — giraffes, 65% — fish, 58% — cats, 92% — trees and flowers, 73% — houses, and 58% — cars. Figures began to look like the objects they were intended to represent, with at least 50% of the children adopting *suitable,* graphically distinctive models for the representation of humans, animals and man-made objects. No longer were the children satisfied with a global "animate" model. The vertical length dimension of the human body and the graphic differentiation of its major parts were stressed (see Figure 1). Cats got whiskers, triangular ears and a horizontal body, frequently with a tail. The giraffe boasted some of the characteristics of this animal, namely, a long slender diagonal neck, ears, horn-stumps and spots, and was usually represented in a sideways orientation (see Figure 2). Fish and birds came to resemble their real-life counterparts (see Figure 2), houses became almost exclusively angular (79%), while cars began to resemble VW models, trucks and fire engines (60%). Only in the four year old group did children draw designs on the free drawing tasks (31%). The designs were still quite simple in their

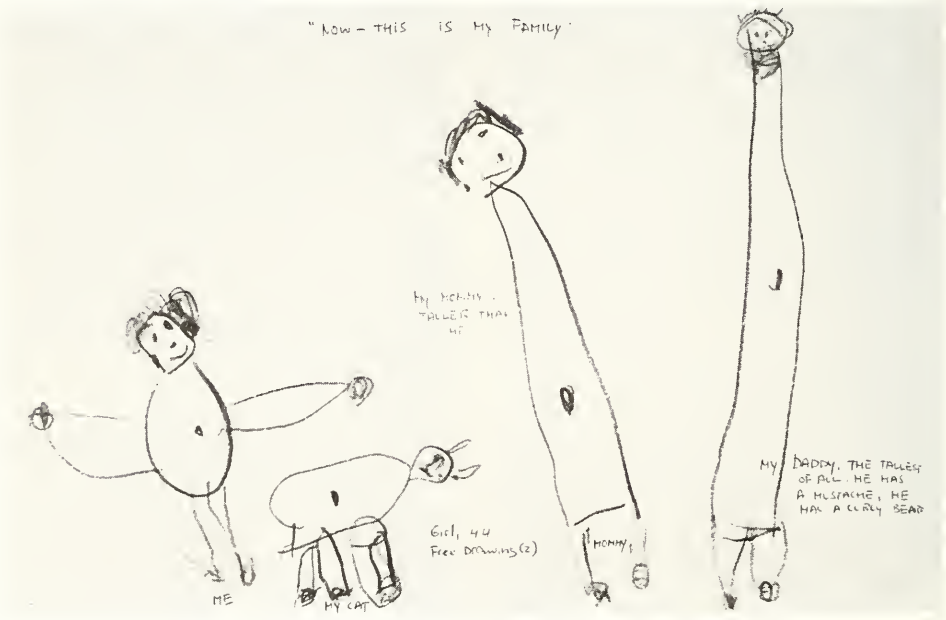

Figure 1. The human figure becomes graphically differentiated along the vertical axis and is represented in full frontal view.

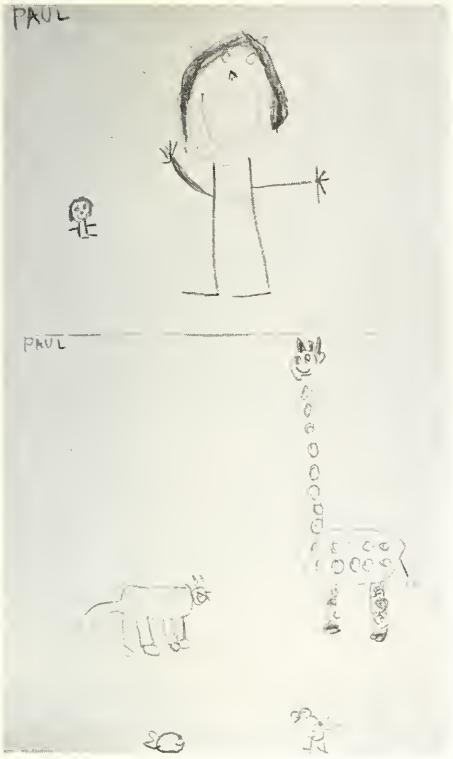

Figure 2. The giraffe is now graphically marked by its long neck, horn-stumps and spots, while cats sprout ears and whiskers as defining characteristics.

construction and could best be characterized as "combines" (see Figure 3). Usually, the child spontaneously interpreted his designs and assigned some meaning to them, for example, a crossed square became a "cage." Occasionally, a child asked the examiner if *she* knew what the figure was.

The developmental progression observed in the work of the 4 year old children became more pronounced for 5 and 6 year olds. Humans and animals were now almost exclusively drawn in their preferred graphic orientations which highlighted the visual characteristics of the object: in the case of the human — a frontal view, in the case of most animals — sideviews, and in the case of the bird — frequently aerial

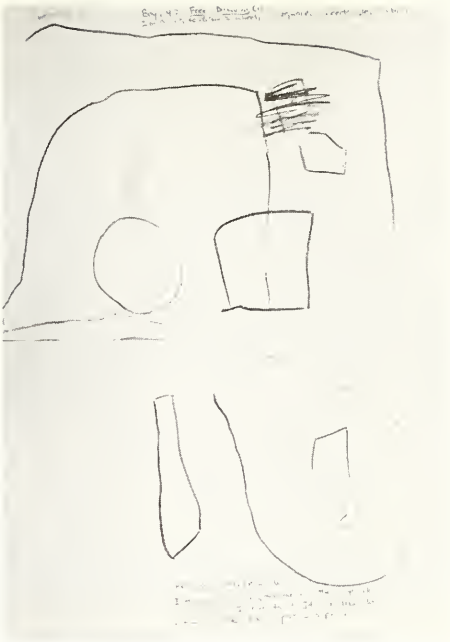

Figure 3. Designs called "combines" on the free drawing task of a four year old.

views (see Figure 4). With few exceptions, the mean graphic differentiation scores for the different figures did not increase between the ages of 5 to 7 years. Instead we see an increase in single outline drawings which attempt to encompass all the parts of the figure in one sweeping line, and efforts to lend more solidity to the outlined figures by shading and coloring techniques. Compositional improvement in the organization of the figures was also observed and "scenes" and "narratives" became more prevalent, with here and there an attempt to deal with different perspectives. Designs declined to a mere 10% of the total productions on the free drawing tasks, and consisted mostly of simple geometrical forms.

The previous findings suggest that the objects in the real world rather than the practice with designs determine the selection of representational forms and models. The forms children

Figure 4. Sideviews of animals predominate and become the preferred orientation.

use when they construct humans, animals or houses are few and simple ones. While previous practice with forms may facilitate their use, the child's representational intention ultimately determines the choice of patterns, whether previously practiced or newly invented. This is nicely demonstrated in the draw-a-flower task by a 5 year old. In this task the child employed new graphic forms not utilized on the ten preceding ones: She first drew the "grass" using a zigzag pattern; from the center of the lawn arose the flower on its stem, with petals extending in a radial somewhat pointed pattern. To analyze this drawing in terms of scribbles and combines would reduce this symbolic act to the level of prerepresentational thought.

This brings me to the third question, namely, the cognitive deficit hypothesis and its current status as "production problem."

According to Norman Freeman (1976a, 1976b, 1977a), the drawing task requires two types of ordering or sequencing: a spatial ordering along a vertical axis and a temporal ordering in terms of what comes first, second and third. In regard to the spatial ordering, the head and legs serve as two poles, providing end-anchors for the figure. How does Norman Freeman account for the missing trunk of the tadpole figure, and the frequently missing arms? Freeman suggests several possible serial position effects: (1) Primacy and recency effects would favor the first and the last item in a series which would be ordered as follows: *head* — body — arms — *legs.* (2) Another serial position effect considered by Freeman is pair-formation, with the attention being paid to the *first* and *accentuated* member of each pair, for example, *head* — trunk, *legs* — arms. As these examples demonstrate, Freeman relies heavily on a presumed verbal order which may guide the drawing process and account for the omissions. Inadvertently, perhaps, Freeman also adopts a "copyist" notion of art, since this interpretation implies that something is missing and that an error has been committed.

Freeman has also been concerned with the misplaced arms syndrome (1975, 1976a, 1976b, 1977b). His study of the body proportion effect suggests that the localization of arms is a function of the size of the circle. If the top circle is oversized, the arms will extend from the head; if the bottom circle is oversized they will extend from the trunk. Freeman conceives of the serial order and body proportion effects as production problems — as planning problems that are the results of incomplete or faulty translation rules — but do not indicate conceptual confusion. However, whether we call it synthetic incapacity, conceptual immaturity or production deficit, these terms refer to the *cognitive limitations* of the preschooler.

End-anchor effects or performance errors in the recall of a newly learned series have also been examined by Tom Trabasso and his associates (1979). In a series of studies these authors have attempted to link the recall of actions performed on various body parts to the child's imperfect drawing of the human figure. Trabasso contends that the child as well as the adult integrates new information into a linear order which, in the case of the human body, leads to internal spatial mapping of the learned parts onto a vertical axis. When tested for retention, this process of mapping favors the end-points, i.e., the recall of head and legs. Thus, Trabasso first equates learning of new material and its retention in short-term memory with the child's internal representation of the human figure; he then links this internal representation to the graphic output of the human figure drawing. This interpretation, however, seems unwarranted, since Trabasso has neither tested the child's inner spatial representation of the human figure nor his knowledge of its parts. The child's knowledge of the human body is quite extensive and much more detailed than his drawings indicate, a finding well documented by Golomb (1973, 1974, 1977a, 1977b). Wallach & Bordeaux (1976) and Bassett (1977). Moreover, in the drawing task the child's inner representation of the human body need not be his only source of information since the body of the adult examiner and that of the child are in plain view and can be inspected, a condition unparalleled in the retention tasks studied by Trabasso. Finally, when drawing, young children do not simply follow a linear progression from the top to the bottom, i.e., from the head to the legs (often omitting the feet even though they are the natural endpoints). Children frequently inspect their drawing, return to the top or middle parts for the addition of features and embellishments, while also offering verbal corrections, addenda, and interpretations. Thus, inferences about internal representations from children's drawings should be made with utmost caution (Kosslyn, Heldmeyer & Locklear, 1977).

Freeman's and to some extent also Goodnow's (1977) search for simple rules that determine the output, the desire to find a formula or routine that can automatically account for the defects of the product, ignores the basic question of what the children's intentions are, and what graphic meanings they are trying to convey.

In order to examine the presumed relationship between the verbal and the graphic ordering of parts, between the child's tacit knowledge of the human body and its graphic representation, and to clarify the meaning of arms attachment to the global circle, the following experiment was designed. Forty children, ages 3 to 5 years were given a series of tasks extending over 3 days. The tasks assessed graphic representational reversibility, the verbal order of body parts, drawing with specifications, completion tasks and representational judgment tasks. The common denominator for all tasks was the representation of the human body

under various instructional and task constraints. All the children were tested individually by Debbie Farmer who administered all the tests.

On day 1, the *reversibility tasks* were administered. Each child was first asked to draw a person, our standard task. Three additional drawings were then requested: (1) draw a person — begin with the legs, (2) draw a person — begin with the arms, and (3) draw a person — begin with the tummy.

On day 2, the child was first asked to list *verbally* all the parts of the body known to her, and next she was instructed to *dictate* to the examiner all the parts she (the experimenter) might draw if she were asked to draw a person. Subsequent to the verbal tasks, each child was once more instructed to draw a person followed by three *draw a person tasks* that *specified* an item or bodily part: (1) draw a person with a flower, (2) draw a person with a big fat tummy, and (3) draw a person with a big black coat.

On day 3, children were presented with several sets of prepared drawings. *Task 1,* a *completion task,* consisted of drawing arms on three separately presented armless and faceless figures, each of which consisted of two attached circles and legs. The proportion of head to body varied as follows: Figure 1, top circle 2″ in diameter, bottom circle, 1″; Figure 2, top circle 1″, bottom circle 2″; Figure 3, each circle 1½″. The legs in each case were 1½″ in length. The order of the presentation of the figures was counterbalanced. The instructions were as follows: "Someone started to draw this person and forgot to add the arms. Please, draw the arms." *Task 2* consisted of a single sheet of paper on which 4 humans were drawn, and called for the child's *judgment.* The figures were identical with the exception of arms placement. The latter varied as follows: Figure a, extension from the center of the torso; Figure b, extension from the center of the head; Figure c, extension from the intersection of head and torso; Figure d, extention from the top of the head. Subjects were asked the following questions: "Which one looks best? Can you tell me why?" "Which one looks worst? Can you tell me why?" *Task 3,* also a *judgment* task, consisted of three sets of paired figures, each one composed of a top circle with eyes, a bottom circle, and legs. The left figure in each set consisted of a large top circle, 3″ in diameter, and a small circle 1″ in diameter. The right figure in each set consisted of the identical circles, with the placement of the top and bottom circles reversed. In the first set, the arms extended from the top circle, in the second set they extended from the bottom circle, and in the third set from the intersection of top and bottom circles. These sets of paired figures were also presented in a counterbalanced order, and the child was asked for his judgment: "Which one looks best? Can you tell me why?" "Which one looks worst? Can you tell me why?" The figures used in the completion and judgment tasks represent variations on Norman Freeman's completion figures (see Figure 5).

The results for the *reversibility* study are quite surprising. All our subjects performed equal to or better on the reversibility tasks than on the standard draw a person task. Of the 3 to 4 year olds, 66% performed better on the reversibility tasks than on the standard draw a person task. Of the 4 to 5 year olds, 56% performed better on the reversibility tasks. Not a single subject performed worse. Varying the task demands also improved the organization of parts, increased their number, and facilitated the adoption of new forms.

The effects of task *specification* were also positive: 42% of the children maintained their score, 42% showed an improvement, while only 16% showed a decline in scores.

The two *verbal order tasks* yielded different results. Almost all subjects

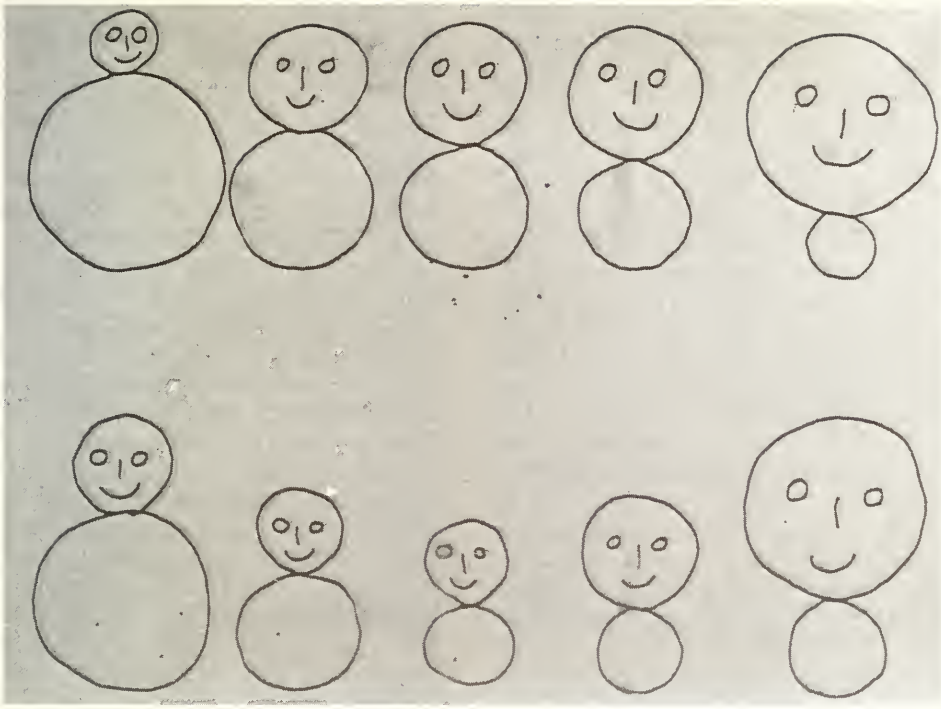

Figure 5. Freeman's completion figures.

(89%) offered a different verbal order on the two related tasks which clearly conflicts with Freeman's notion of a fairly uniform verbal sequence that guides graphic production, and does not confirm Trabasso's assumption of a standard internal representation of the body that yields comparable printouts on different tasks. Also, the number of parts named or dictated usually exceeded the number of drawn parts. For example, the body or its equivalent was included in 70% of the verbal descriptions while its graphic counterpart appeared in only 28% of the drawings. The variability in the different types of verbal sequences was high, and even "favored" sequences were modest in frequency; for example, the head-body-legs-arms order appeared in 11% of the sample, while the order head-body-arms-legs occurred in only 5% of the verbal productions. Altogether, a flexible graphic order that proceeds from top to bottom, but permits additions subsequent to the drawing of the legs, seemed to characterize the drawings of most children. This graphic order appeared to be more consistent than the verbal one.

The *judgment of arms placement* task yielded unambiguous results. 70% of the children selected the "correct" figures as the best looking (Figures a & c), while 85% agreed that arms extending from the head region did not look well. Those few subjects who selected Figure d, with arms extending from the top of the head, explained their choice in terms of "hair," while those selecting the figure with the arms extending from the center of the head, transformed the lines into "ears." Thus, all the subjects responded to the prepared figures in terms of what appear to be graphically and anatomically reasonable judgments.

Judgment of paired comparisons elicited the children's resistance to this task. They appeared conflictive, shifted

their judgments, and required a great deal of encouragement on the part of the examiner before they offered a judgment. Indeed, the responses were equally divided among the paired figures, with an equal number of subjects preferring the figure with the huge head or the huge torso. Very few children made consistent choices. Most children would select a huge head as the best *and* the worst figure over the series of tasks. We can better appreciate the children's discomfort when we acknowledge that these figures are disproportionate, aesthetically displeasing, and even grotesque. The figures do not permit an adequate solution to the task. This dilemma is nicely illustrated in the comments of a youngster who, forced to make a choice, selected the figure consisting of a huge head and a tiny body with arms extending from the top circle, as the best figure (see Figure 17, set 1): "This is cuter, the arms are *not* on his head — almost!" On the second figure of this set composed of a tiny head and a huge body he commented: "This is the worst because the arms are on the head."

The *arms completion test* yielded fairly predictable results. When the top circle was the larger one, 72% extended the arms from this form. When the top circle was the smaller one, this shrunk to 17%. When both circles were identical in size, 78% of the children preferred to extend the arms from the second circle. Once again, these figures do not permit graphically reasonable solutions. In their extreme versions, they represent artifacts, and are basically unacceptable to the children. The children's comments indicate that they tended to "transform" the figures to suit their conceptions. In most cases, where the top circle was the larger one, children interpreted this part as a "big belly." Several turned the paper around or stated that the figure was upside down.

In summary, I venture to say that the reversibility study does not support the production deficit hypothesis. Contrary to this hypothesis, an unsuspected *cognitive flexibility,* here termed reversibility, was demonstrated, a finding which forces us to reconsider the extant versions of the cognitive deficit hypothesis of children's drawings. Not only was the production process reversible, under the constraints of the instructions additional parts were drawn, and the graphic forms changed to accommodate the new demands. If the "problem" is *not* one of serial order, and perhaps not even of limited processing capacities, perhaps we are back to the concept of *visual graphic logic* (Arnheim, 1974; Golomb, 1974), and ought to explore its implications more fully. Earlier studies have shown that the issue of the "missing parts" rests on a copyist notion of art, and fails to do justice to its representational nature. In the 20th century it has become easier for students of child art to abandon the simplistic conception of art as a faithful copy of the object, and we are not likely to hold Klee and Picasso to standards of realism and completion. Nevertheless, copyist misconceptions still abound and are at times truly puzzling, as is the case when arms are supposed to be drawn from the center of the second, vertically aligned circle, regardless of its size. This conception does not follow from the principle of anatomical fidelity (arms do *not* extend from the region of the navel) nor does it rest on the aesthetic rule of balance which would favor the larger circle, regardless of its position on the vertical axis.

The completion and judgment data tell us an informative story. When the figures are grossly disproportionate, the children face an acute conflict. The figures do *not* look right, and even though the experimenter may define the top circle always as the head or

face, the child does not necessarily agree with that statement. Essentially, the figure completion and judgment tasks of this study have no adequate solution, and the child either wavers (as most did), or he silently redefines the task. If he attaches the arms to the huge top circle, it usually becomes a head-belly conglomerate. The selection of the best/worst figures, when arms attachment was varied while maintaining head-body ratios constant and graphically meaningful led to unambiguous results, and demonstrates that the child's knowledge is not at fault; given reasonable problems, the child's solutions are also reasonable. For the student of child art, the implications ought to be clear — design figures that are graphically meaningful to the child.

The findings of (1) a precocious representational ability in 2 year olds who scribble on the free drawing task but represent a human on the assigned tasks (39% on-request or on-dictation) and (2) the complete reversibility of the human figure drawings of 3 year olds require a thorough reassessment of our conception of the cognitive abilities of preschoolers. Apparently, under the constraints of specific task demands, we can tap usually as yet dormant abilities.

Our findings indicate that the evolution of representational forms is *more* than combining earlier practiced shapes and sub-routines, more than the sum of graphic exercises. It is the object and its visual characteristics that codetermine the graphic organization and choice of forms. This is not to say that child art, overnight, becomes realistic. We can clearly see that forms are used economically, that the tendency toward simplicity predominates for a long time, that simple and basic forms have to serve multiple functions and leave the meaning of the figure somewhat ambiguous. But the urge to represent has a referent out there in the real world, and it guides the process of differentiation to an important degree. I would like to suggest that the child's drawing is determined by the *search for meaning* and likeness, but that it is also constrained by the child's experience with the medium, by his interest, motivation, attention span and playfulness. In the words of a 4 year old girl: "I am making a mommy . . . 1 toe, 2 toes, 3, 4, 5 . . . I even made toes! Five toes on one foot and 6 toes on the other. I just thought it would be funny . . . Look at the mommy, I'm making some skin for her . . . the paper is skin . . . I'm just pretending . . . the lines are the shirt, I just pretend."

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RESPONSE TO GOLOMB

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My comments will be restricted to the first part of Professor Golomb's paper which refers to Kellogg's work. I agree with Claire Golomb that Arnheim's explanation of children's early drawing development makes good sense, and I share Golomb's reservations regarding the explanation outlined by Rhoda Kellogg. I admire very much Golomb's innovative approach to research in the drawing of young children. Especially impressive are the drawing on dictation tasks and elicitation of drawings across age groups. These are very useful techniques for discovering what children are thinking and what they are capable of accomplishing at a given point in their development.

Professor Golomb's analysis of Kellogg's theory is interesting and welcome. However, it should be recognized that Kellogg's views on children's artistic development, beyond the useful collecting and cataloging of many drawings, have not been very influential in the field of art education. I searched the authors' footnotes and bibliographies in seven recent anthologies of writings on the arts, aesthetics and education, all in the mainstream of art education, literature,[1-7] and I found Kellogg's name mentioned only three times, once by myself and in all cases in regard to her collection of children's art. The seven books included 121 articles or excerpts and well over 1,000 references, including one article with 190 footnotes and one reference to Kellogg's work.

Golomb challenges Kellogg's position that, in Golomb's words, "child art evolves from non-pictorial designs, unaffected by the visual attributes of the object."[8] In fairness to Kellogg, her own statement is not so unqualified as Golomb's version. Kellogg writes: "However, the general evolution of shapes in children's art *suggests* that the process is largely independent of such observation. In any case, the shape-making tendency of children is so strong and pervasive that it seems to be innate, *whether or not* it is brought out by experiences other than scribbling."[9]

Golomb then attempts to demonstrate by her research that children's early drawings are pictorial and are "forms of equivalence" made in response to the visual environment. The case that Golomb makes is interesting but not very convincing. She appears to make the same type of imposition of her "preferred taxonomy" on children's drawings of which she accuses Kellogg. She comments, "If we observe the child at work and listen to his comments, we notice his discomfort when the drawing fails to meet his standards of likeness."[10] We do? If we can interpret the young child's physiognomy to convey "discomfort," how do we know it is because the drawing fails in some way? How do we know that he has standards of likeness and that the drawing has failed to meet these standards?

In this paper Golomb does not seem to recognize the kinesthetic aspect of scribbling or mark-making for children. Eisner points out that "the rhythmic movement of the arm and wrist, the stimulation of watching lines appear where none existed before are themselves satisfying and self-justifying. They are intrinsic sources of satisfaction."[11] Children do seem to enjoy the making of marks, lines and colors,

with pencil and crayon. Children who spend time marking and scribbling do eventually draw shapes and name the shapes. These shapes very often are found within the context of scribbles on a paper. Parents who are aware of the beginnings of children's graphic symbolic behavior have been able, by carefully observing their child, to identify their child's first named scribble. This type of evidence supports Kellogg's contention that forms of equivalence or symbols emerge out of children's presymbolic marking production. Normal children who are provided the opportunity at early ages progress from scribbles to symbols.

From Golomb's paper it is difficult to ascertain exactly what points she is attempting to make. She mentions the child's verbalization "to bridge the gap between what he has produced and the meaning it fails to convey, between his perception of the objects and his inadequate representation thereof."[12] What is the point of this direction in the paper? Golomb is apparently referring to symbol-making children and does not appear to be in conflict with Kellogg on that point.

Golomb cites Harris, Haas, and Millar to describe unusual cases of persons deprived of marking materials who progressed quickly to symbol-making with very brief attention to scribble exercises. These cases suggest that it is not necessary, under some circumstances, to progress through Kellogg's sequence from scribble forms to placement patterns, to emergent shapes, diagrams, combines and aggregates. But does Kellogg insist that even persons who have developed physically and intellectually beyond the normal ages for scribbling must start at the beginning of the sequence? Does Kellogg's theory allow for very rapid progress through the sequence by more mature persons? Golomb fails to clarify Kellogg's position and, consequently, makes little progress in refuting it.

The significance of Professor Golomb's research approach is centered in her brilliant decision to ask children about their drawings and to elicit their response to drawing tasks. By asking several age groups to perform the same drawing tasks, she demonstrates their progress in drawing. However, in the interpretation of the data Golomb makes unwarranted theoretical leaps. Because the children utilized their graphic repertoires to attempt to draw objects when requested to do so, Golomb concludes that "their prime concern is with visual likeness to the object."[13] I suggest that the concern of the children was strongly influenced by the required task. Even the instruction to the children to draw "a picture of anything you like" has a strong representational bias.

Golomb did discover that, under certain conditions, some children who initially scribbled in response to the drawing request could produce a representational drawing. I don't believe that this discovery indicates that these children had not produced representational drawings prior to the experiment along with their scribbles. What is not considered is that children have multiple concerns regarding their drawing; that making a scribble can be rewarding for the child as well as making a symbol. Little seems to be gained by demonstrating that prerepresentational children are really representational and are primarily concerned with visual likeness to an object. If this is the case then they are not prerepresentational, by definition.

In summary, I was disappointed that the issues were not more clearly drawn and that the significance of the study and the implications, either psychological or educational, were not discussed in any length.

Footnotes

1. Stephen Dobbs, ed., *Arts Education and Back to Basics* (Reston, Virginia: NAEA, 1979).

2. Elliot Eisner, ed., *Reading, the Arts, and the Creation of Meaning* (Reston, Virginia: NAEA, 1978).

3. George Pappas, ed., *Concepts in Art and Education* (London: Macmillan, 1970).

4. Elliot Eisner, ed., *The Arts, Human Development, and Education* (Berkeley: McCutchan, 1976).

5. Stanley Madeja, ed., *Arts and Aesthetics: An Agenda for the Future* (St. Louis: CEMREL, 1977).

6. Stanley Madeja, ed., *The Arts, Cognition, and Basic Skills* (St. Louis: CEMREL, 1978).

7. Gerard Knieter and Jane Stallings, eds., *The Teaching Process and Arts and Aesthetics* (St. Louis: CEMREL, 1979).

8. Claire Golomb, "Representation and Reality: The Origins and Determinants of Young Children's Drawings," Unpublished paper presented at the National Symposium for Research in Art Learning: Representation and Metaphor, University of Illinois at Urbana-Champaign, October, 1980, p. 3.

9. Rhoda Kellogg, *Analyzing Children's Art* (Palo Alto: National Press Books, 1969), p. 32, emphasis mine.

10. Golomb, *Ibid.*

11. Elliot Eisner, "What Do Children Learn When They Paint?" *Art Education,* Vol. 31, No. 3, March, 1978, p. 6.

12. Golomb, *Ibid.*, p. 4.

13. *Ibid.*, p. 7.

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RESPONSE TO GOLOMB

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Although useful research probably should raise many questions in its attempt to supply answers, surely these questions should be about the material or ideas under investigation, and *not* be about the research procedures themselves. I fear, in the case of Professor Golomb's study, my questions must be focused on her assumptions, biases and methods more than on the much stickier problems immersed in the wellsprings of children's drawings. I seem to have at least one such query for each of her pages, but I'll only introduce a few that are, for me, particularly juicy.

Early in the study Golomb comments on the use of "words to bridge the gap between what he [the child] has produced and the meaning it fails to convey, between his perception of the object and his inadequate representation thereof." Her interpretation, stated as fact, makes no effort to examine the possibility that the verbal-graphic experience is a unity and that the experience is more of a transient drama than an attempt to gain mastery over graphic representation; the "meaning" of the drawing may change every hour on the hour. Nor does Golomb take into account what the "object" is that youngsters are seeking to make a "likeness" of. In using a giraffe, for example, as one of her test examples, can she believe that 2 and 3 year olds have directly experienced that animal? Is she taking for granted experience with ABC books or other sources of pictures? Does the evolution of graphic imagery, as described by Kellogg, depend upon cultural norms, so that Western kids indeed do evolve in a fashion suggested by Kellogg's stages (surely not to be understood as absolute!), because they are visually raised on a multitude of graphic images? Might Golomb's references to Bedouins and Peruvian Indians, in which they "skip" the scribble stages in order to produce tadpoles, reflect graphically impoverished cultures rather than a destruction of Kellogg's insights? In what ways, to return to my first point, do the early prattlings of infants appear to be attempts to capture the word symbols (parallels of graphic likenesses) of their aural environment? What role does "play" fulfill in youngsters' scribbles and eventual production of representational pictures? Are such images idiosyncratic in character or can conventions and stereotypes account for the vast majority of them? In other words, has Golomb's bias (can we really call it an assumption?) about the representational nature of the urge to draw kept her from a more open examination of alternative answers to her original questions?

I wonder what would have happened if the 250 young children were given different drawing tasks? Say that they were asked to draw an "angry" or to make a picture of love? Suppose that the instructions requested a hypogriff or a bandersnatch instead of a worm or a tree? What likeness would such drawings seek? Again, the bias is clear, that there is always an external referent that the child seeks — a visual armature

Note: This commentary is made in response to a paper sent in advance of the Symposium. In fairness to Professor Golomb, some of the points found questionable may have been clarified or amplified during her presentation and subsequent discussion. My overall concerns, however, remain intact.

over which to mold his drawing. Of course, this is a prejudice found in our culture, exemplified by such contrivances as coloring books and reading readiness materials. Maybe drawings aren't made to be the verbal surrogates demanded by teachers and parents and researchers like Golomb. In other words, perhaps the design of this study was limited to uncover one kind of activity that children are expected to engage in (note the forceful and contrived instructions given by the researcher to the kids) rather than in the more natural messing around that youngsters engage in on their own. Why not examine these more freely produced images: the finger marks on the foggy window pane, the stick-made scratches in the seaside sand, the doodles drawn in the spilt chocolate milk? By setting up the sterile laboratory, can we really expect to discover how the wild animal develops?

Thus, while no disciple of Kellogg, particularly when she insists on seeing universal characteristics of graphic development, I believe Golomb has set her up as a straw woman in order to knock the stuffings out of her. By totally ignoring (at her own admission) the constraints of "the child's experience with the medium, . . . his interest, motivation, attention span and playfulness," what are we to make of her claims? Most problematic, for me, is the cavalier attitude about the nature of art itself that I infer from this report. Somewhere, Golomb has been led to believe that drawing is art and that child art is a "symbolic-transformation process" whose "prime concern is with visual likeness to the object." If she were content to deal with the more simple matter of the development of graphic images, representational images or symbols or pictures, my unease would be a bit less than it is. However, there is the direct call to art that stirs my own set of prejudices.

Take her Task 2 which has the four so-called humans drawn on it. *"Aesthetic judgment"* is called for because the child is asked "Which one looks best . . . Which one looks worst . . .?" How can one be so misguided by the concept of aesthetic judgment? Perhaps the subject could give an anatomical response and reject them all as pretty silly figures. Surely what is most apt to happen is a psychological report. Show me four young women and ask me the question and I doubt that my response would have much to do with aesthetics. Indeed, we find out that "*all* the subjects responded to the prepared figures in terms of what appear to be graphically and anatomically reasonable judgments." Again, why the need to interject aesthetic preferences? Don't we have plenty of very questionable aesthetic preference studies on our shelves now?

Finally, and perhaps unfairly, I wonder if Golomb's conclusion that "a thorough reassessment of our conception of the cognitive abilities of preschoolers" would have been made if she were an active teacher of these emerging human beings. Whose conception is she talking about? Do those of us who keep in the swim of teaching have any doubts about the "dormant abilities" of youngsters? One of the routes for waking these abilities has been the challenge offered by aesthetic activity, play unconstrained by predetermined theories of graphic imagery or the assumptions that some adult patterns of symbol-referent relationships are the way all children evolve. "Child art" is indeed a part of the learning scheme of maturation. But if we're to muck about with this process, we had better understand art as well as child development. I fear Golomb comes up a bit short on the former requirement, if this study is a fair example of that knowledge.

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RESPONSE TO GOLOMB

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In this paper, Golomb has chosen to question some of the long standing suppositions about child art and to shake the foundations of these beliefs. As usual, she is thorough and insightful and sees the child, rather than a mechanical design maker, as a thinking and knowing human.

The first questions concern the developmental patterns espoused by Rhoda Kellogg. Golomb asks whether the "block-building" process outlined by Kellogg, which proceeds from scribble to diagram to combine to aggregate, actually describes the graphic development of the child, a question that requires an answer such as Golomb is able to supply — one based on more than systematic collection techniques. In summarizing Kellogg's position: "child art evolves from non-pictorial designs, unaffected by the visual attributes of the object," Golomb reveals her own prejudices toward "visual attributes." While I am in agreement with the premise that most of the child's early drawing activity is based upon the simple and undifferentiated configurations of the circle and the line and that the "building-block" notion is indefensible, I am a bit uneasy on the matter of "visual representational logic." Golomb continually refers to "likeness to the object," "standards of likeness," "impact of the visual world," and "perception of the object." I am much more comfortable with another statement: "The forms, which the child uses to represent his first objects, are indeed forms of equivalence; they must serve a symbolic function, and in some fundamental way, they must do justice to the referent." I'm sure that Golomb would agree that the *referent* refers not only to the object in the visual world but to the child's memory of the object — the child cannot, after all, see an actual giraffe when asked to draw one in the experimental situation — the child's memory of his last graphic representation or some other graphic representation, i.e., another child's drawing or a picture in a book, on television, etc.

What sets Golomb's work so far above Kellogg's is not only rigorous research but also attention both to the child's drawings (scribbles) and to the child as well. Kellogg has carefully catalogued hundreds of thousands of drawings, but these finished products give no evidence of a child's hand. We do not know what the child intended; we know only what Kellogg "implied." In Golomb's work, it is clear that she attends to the children, interacts with them and is always aware of their actions and reactions and of the processes involved in the making of their art.

The last question that Golomb asks concerns what she refers to as the "cognitive deficit hypothesis" of Luquet and Piaget. Here, she lumps with these earlier theorists and their concept of "synthetic incapacity," Norman Freeman and his own theory concerning the "production problem." From Golomb's account alone, it would not be possible to assess completely Freeman's position, since that account has certainly not only overly simplified Freeman's theories, but has also been colored by Golomb's own biases. It is possible, however, without going beyond the scope of this paper, to say that Golomb's tasks, which have been devised to replicate or to refute Freeman's findings, are short of the mark and tend only to obfuscate rather than elucidate.

The first problem lies in Golomb's interpretation of what Freeman calls a "production problem." In a series of experiments, Freeman has sought to delve into the anomalous tadpole figure. The serial position effects, that he suggests to account for what may or may not be the missing trunk and the frequently missing arms, do not rely "heavily," as Golomb would have it, "on a presumed verbal order." I suggest that all of us suffer from production problems in some form or another. An example might be taken from the experiences of a close friend of mine. This intelligent, articulate and knowledgeable friend, each morning, follows the same dressing routine: he first dons his trousers, zips them, puts on his shirt, unzips his trousers, tucks in his shirt and then rezips his trousers. It would certainly be more efficient to put on the shirt before the trousers, but we would surely not attempt to attribute this lapse to any "cognitive deficit." It is equally ludicrous to even consider that my friend would make the same error in verbally describing his mode of dressing; the "problem" is not evident in any verbal ordering, but in the act (of dressing) itself, in the *production,* as it were.

The reversability and verbal order tasks with which Golomb tested the children seem, then, not to be relevant to the problem. In demonstrating that the child is able to name the body parts, to reverse, upon request, the order in which parts are drawn and, in the process, to add more parts — certainly when those parts have been suggested by the experimenter — Golomb seems to have confirmed Freeman's position that the "problem" of the child who draws head and feet only to stand for a human, is not a "cognitive deficit" but one of production.

In Golomb's criticism of Freeman, perhaps the most important, though unexpected insight for the reader, comes as a result of her *body proportion effect* and *aesthetic judgment* tasks. While the figures that Golomb uses are said to be a "variation" of those used by Freeman in his own studies, they appear to be more aberrant than any of Freeman's, the use of which he justifies by citing their presence in children's drawings. None of the figures in the Freeman study, for example, were possessed of the strange stumpy legs with which Golomb endows hers; and no figures were used that were not found in any number of studies (Freeman's among others) to have been within the realm of the child's drawing experience, e.g., arms placed on the top of the head segment. In spite of these obvious discrepancies, Golomb's findings were the same as Freeman's — that the child tends to place "arms" on the larger of the two circular body segments, regardless of position. In a further attempt to show that these "figures" were not "meaningful" to the child, Golomb asked the children to select the best/worst figures in two separate *aesthetic judgment* tasks. The results indicate that while a child will place the arms on the largest segment of a large head/small body configuration, he will nonetheless judge that same figure to be unpleasing. What Golomb has shown is not, as she states, that children give unreasonable answers to unreasonable questions, but that children will follow their own intrinsically based propensities or, as Freeman would have it, biases, and that they are compelled to do so even when they view the result as unaesthetic. I would suggest that the drawing child's "search for meaning and likeness" is constrained not only by "the child's experience with the medium, by his interest, motivation, attention span and playfulness" but by the inner dictates of his biases as well, two of which Freeman identifies as the *serial order effect* and the *body proportion effect.*

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THE COGNITIVE DYNAMICS OF SYNESTHESIA AND METAPHOR

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I arrived at Dartmouth College in the fall of 1935, firmly convinced that I was destined to write The Great American Novel, but after a course with the late Professor Theodore Karwoski (affectionately known as "The Count") I forgot all about writing novels. Karwoski and a young associate, Henry Odbert, were busily working on *color music synesthesia,* and by my junior year I was busily working along with them. Rather than viewing color-music synesthesia as a phenomenon in a few freak individuals whose "sensory wires are crossed," Karwoski and Odbert viewed it as a fundamental characteristic of human cognizing — more vivid in some (who regularly indulge as a means of enriching their enjoyment of music) but shared by many others who display the same "rules" for relating sounds to sights.

In my own research with Karwoski and Odbert (1942), three conditions were used: In one, practiced synesthetes were asked to draw their "responses" to simple melodic forms played on a single instrument — e.g., a tone which simply gets *louder* and then *softer,* where typical drawings are forms that get *thicker* and then *thinner* again, bands of color that get *richer* and then *paler* again, and explicitly meaningful ones like a little car that comes *closer* and then goes *further* away. In a second, subjects who had never even thought of "seeing things" when they heard music, were told that they had to draw *something* for each auditory stimulus; *they* produced exactly the same types of "synesthetic" translations. In a third experiment, 100 unselected sophomores were given a purely *verbal* "metaphor" test, in which the auditory-mood and visual-spatial relations observed in complex synesthetes were simply translated into pairs of polar adjectives (e.g., LOUD-SOFT; SMALL-LARGE); once again the relations displayed by "real" synesthetes were chosen, here, 96% linking LOUD with LARGE. We summarized our research with this statement: the cognitive processes in both color-music synesthesia and in metaphorical use of language can be described as the parallel alignment of two or more dimensions of experience, with "translations" occurring between equivalent regions of the continua.

After graduation and marriage in the summer of 1939, I decided to stay on for an extra year at Dartmouth, and I also was able to work with Ross Stagner, who had just arrived. Stagner and Osgood (1946) adapted the notion of "parallel polarities" to the measurement of social attitudes and stereotypes, by using sets of 7-step scales defined by pairs of opposites (e.g., rating PACIFIST against scales like *fair-unfair, valuable-worthless,* and *strong-weak*). Later at Illinois (in the early 1950's), this became the Semantic Differential Technique. Much later, this SD technique was to be extended cross-linguistically across (now) 30 language-culture communities; the results clearly demonstrate the universality of

An earlier version of this paper has been published in *Cognition and Figurative Language* (a volume edited by R. P. Honeck and R. R. Hoffman), 1980.

three affective features of meaning, Evaluation (E), Potency (P) and Activity (A). My undergraduate thesis at Dartmouth was a study of synesthetic and metaphorical relations in field reports on five widely separated primitive cultures; the generality of certain parallelisms was quite striking, e.g., *good* places and things being *up* and *light,* but *bad* being *down* and *dark* — and members of a privileged clan calling themselves "white bones" as against all others who were "black bones"!

My lecture is organized under three major topics, each with certain major subdivisions. The first is simply *Synesthesia,* and it falls easily into *cross-modality,* purely perceptual, *synesthesias,* and *perceptuo-linguistic synesthesias;* the second topic is titled *Congruence Dynamics,* and it divides naturally into *gross affective* vs. *fine denotative* cognitive interactions; the third topic is simply *Metaphor,* where a useful distinction between metaphoricity *in phrasing* and *in sentencing* is made.

SYNESTHESIA

Synesthesias appear in a wide variety of forms, but all involve *meanings* in non-linguistic perceptual cognizing, which surely was much earlier in the human species than linguistic cognizing. The evidence falls rather naturally into two types: (1) *Cross-modality perceptual synesthesias,* with which much of the earlier research was concerned. Here, meaningful translations are made between one sensory domain and another (e.g., auditory/visual modalities). A transition via *phonetic symbolism* leads naturally into (2) *perceptuo-linguistic synesthesias,* with which much of the most recent research has been concerned. Here, meaningful parallelisms are drawn between perceptions in one sensory modality (usually vision) and words in language (usually polar adjectives).

Cross-modality Perceptual Synesthesia

The earlier research was often designed, and interpreted, in terms of the "freak individuals" who have neural "cross-circuiting of the sensory fibers" for two modalities. For examples: Langfeld, in 1914, reported the case of a girl who associated certain specific colors with different notes on the musical scale, with very high consistency over an interval exceeding seven years; Dallenbach, in 1926, tells of a subject who associated colors with the notes of bird calls. There was a man who consistently "saw" #1 as yellow, #2 as blue, #3 as red. . . and, of course, #8 as black — and anyone who has played pool will recognize these as the colors of the balls having these numbers!

In his *Words and Things* (1958, Ch. 4), Roger Brown provides an extended review of the literature relevant to *phonetic symbolism.* As early as 1929, Edward Sapir reported a study relating syllabic speech sounds to meanings (e.g., given *mal* and *mil,* both said to refer to "table," subjects were to decide which one would refer to a *large* and which to a *small* table); he found impressively consistent agreement on the relative "sizes" of vowels. In my own informal experimentation with male students in my psycholinguistics seminar, I ask them which of three girls they would like to date and then, *with gestures,* to describe their probable body builds; they definitely would prefer *Miss Lavelle* (described like an *8*) to either *Miss Pim* (more like a *1*) or *Miss Bowloav* (definitely a big fat 0)!

Returning now to Dartmouth, in another study Odbert, Karwoski and Eckerson (1942) first had ordinary subjects indicate the dominant *moods* of short classicial excerpts on the Hevner "Mood Circle" and then had them, on a second run-through, say what *colors* seemed appropriate for each excerpt.

There was rather remarkable consistency in the colors chosen: for example, the color *green* for Delius' *On Hearing the First Cuckoo in Spring* and *red* for Wagner's *Rienzi Overture*. Again anticipating verbal metaphor, when subjects were merely given the mood adjectives — going around the Hevner "circle" from *vigorous* through *gay* and *leisurely* to *sad* and *solemn* — and asked to give the appropriate colors, even *more* consistent relations appeared.

My student Murray Miron completed a doctoral thesis at Illinois (1961) which was a *cross-language* (American English vs. Japanese) demonstration of lawful affective connotations in phonetic symbolism. When CVC syllables, which were nonsense in *both* languages, were rated on appropriate Semantic Differential scales, American and Japanese subjects displayed correlations with each other of .57 for vowels and .91 for consonants, respectively, on the Potency factor — low frequency sounds being associated with felt *power* and *size.* On the Evaluative factor, front consonants were rated more *pleasant* than back, again for both languages. Brown, Black and Horowitz in 1955 (Brown, 1958) selected 21 antonymic word-pairs of about equal length (e.g., *warm-cool*) and these were translated into Chinese, Czech and Hindi by native speakers of these languages, who also recorded their pronunciations of the word-pairs. Eighty-five Harvard and Radcliffe students guessed which of the paired English words corresponded to each of the foreign words *as spoken.* Not only was there significantly higher than chance agreement in choice among the subjects, but their guesses were correct *twice as often* as incorrect, where "correct" means choosing the appropriate English translation.

Question: Are such cross-modality perceptual synesthesias *innate* or *acquired?* Although one may grant an innate predisposition toward synesthetic relations, just *what* color, sound, smell, taste, etc. "translations" develop would seem to depend on *learning,* and, in my variety of Neobehaviorism, what is called *mediated generalization* would seem to be responsible. Take the case of auditory pitch and visual size: It is characteristic of the physical world that large-sized resonators produce low frequency tones and small-sized ones high frequency tones (think of series of organ pipes, bells, drums, or even hollow logs, and of the "voices" of men vs. boys, big dogs vs. little ones, or even of lions vs. mice). This implies that any meaningful process that comes to be associated with the perceptual signs in *one* modality (e.g., the danger significance of threatening big dogs vs. the safety significance of playful little dogs) will tend to spread (generalize) to the correlated perceptual signs in the *other* modality. After we consider perceptuo-linguistic synesthesias, I will detail the affective (grosser) and denotative (finer) cognitive dynamics involved.

Perceptuo-linguistic Synesthesia

As was noted earlier in connection with the Karwoski et al. research, when one of the "sensory" dimensions of perceptual parallelisms was represented by words — thus a shift away from synesthesia toward metaphor — the lawfulness of the process became even *more* apparent and stable across individuals (e.g., LOUD going with verbal *near* rather than *far,* TREBLE being *up* and BASS being *down,* and so forth). Very similar notions have been expressed by some gestalt psychologists. Kaden, Wapner and Werner (1955) have contributed a delightful experiment in which subjects were to adjust luminant words projected in front of them in an otherwise totally dark room "to subjective eye-level" by raising or lowering the projected words with a hand dial; the striking finding was that words like *rising* and

climbing had to be *lowered* relative to the pre-experimental determination of "eye-level," while words like *plunging* and *falling* had to be raised (i.e., the upward-meaning words *seemed* visually higher and the downward-meaning words *seemed* lower to the subjects)!

In the late 1950's, while in the Southwest doing psycholinguistic field work sponsored by the Social Science Research Council, I turned back to my interests in synesthesia and metaphor (Osgood, 1960). Four language-culture groups (Mexican Spanish, Navajo, American English, and Japanese) were used as subjects. They were to "rate" each of 28 *verbal concepts,* presented singly in random order, against the pairs of *visual "opposites"* to be considered next. Note that these words are mostly from oppositional pairs, like HEAVY-LIGHT, HAPPY-SAD, UP-DOWN, STRONG-WEAK and BLACK-WHITE, but never presented *as* pairs, of course.

The visual alternatives, on the other hand, *were* shown as graphic pairs, each pair being presented on one of the cards in a deck, the cards being randomized across the subjects in each cultural group. Note that the pairs of visual alternatives displayed in Figure 1, without the verbal definitions, of course, tap most of the synesthetic oppositions found in the earlier Karwoski, Odbert and Osgood studies: thus (going down the *outside* columns) BLUNT-SHARP, HAZY-CLEAR, DARK-LIGHT, HOMOGENEOUS-HETEROGENOUS, THICK-THIN, VERTICAL-HORIZONTAL, NEAR-FAR, and DIFFUSE-CONCENTRATED. *Now,* keeping this visual display in mind, let's look at the major results.

Rotated factor loadings for the *verbal* Concept Matrices (as rated against the visual alternatives) yielded clear evidence for a "universal" Evaluative Factor I: for all cultures, particularly *good, happy,* and *white* were $^{+}$E and *bad, sad* and *black* were $^{-}$E. Also, there was a "universal" Potency Factor II: *strong, heavy* and *man* were $^{+}$P and *weak, light, yellow* and *woman* were $^{-}$P. However, Activity seemed to spread across Factors III and IV: *energetic, excitement* and *noisy* were $^{+}$A and *lazy, calm* and *quiet,* along with *slow,* were $^{-}$A on Factor III, but *light, tight* and *white,* along with *fast,* were $^{+}$A and *heavy, excitement* (??) and *woman* were $^{-}$A on Factor IV.

Some of the consistent *visual* characterizations of oppositional *verbal* concepts are interesting in their own right, and they also tie in with the earlier Karwoski et al. findings: *Happy* is UP, COLORFUL, LIGHT, and CLEAR, but *sad* is DOWN, COLORLESS, DARK and HAZY; *heavy* is DOWN, THICK, DARK, and LARGE, but *light* (*weight* having been specified) is UP, THIN, LIGHT and SMALL; *excitement* is VERTICAL, COLORFUL, CROOKED and SHARP, but *calm* is HORIZONTAL, COLORLESS, STRAIGHT and BLUNT; *woman* is COLORFUL, THIN (except for Mexicans), LIGHT, BLUNT and ROUNDED (except for Navajos), but *man* is VERTICAL (*woman* tending to be HORIZONTAL), COLORLESS, THICK, DARK, SHARP and ANGULAR. These trends for four cultures suggest certain "universal" tendencies.

As regards the "synesthetic" application of terms based on sensory continua to human *personality characteristics,* an early study by Solomon Asch (1955) examined adjectives of this type in a number of historically unrelated languages: Biblical Hebrew, Homeric Greek, Chinese, Thai and several others. Just like English, all of these languages describe many personality traits with words or phrases that have obvious sensory bases. For just one example, in English the word *straight,* when applied to persons, implies honesty and trustworthiness, whereas its opposite, *crooked,* implies dishonesty and untrustworthiness; exactly the

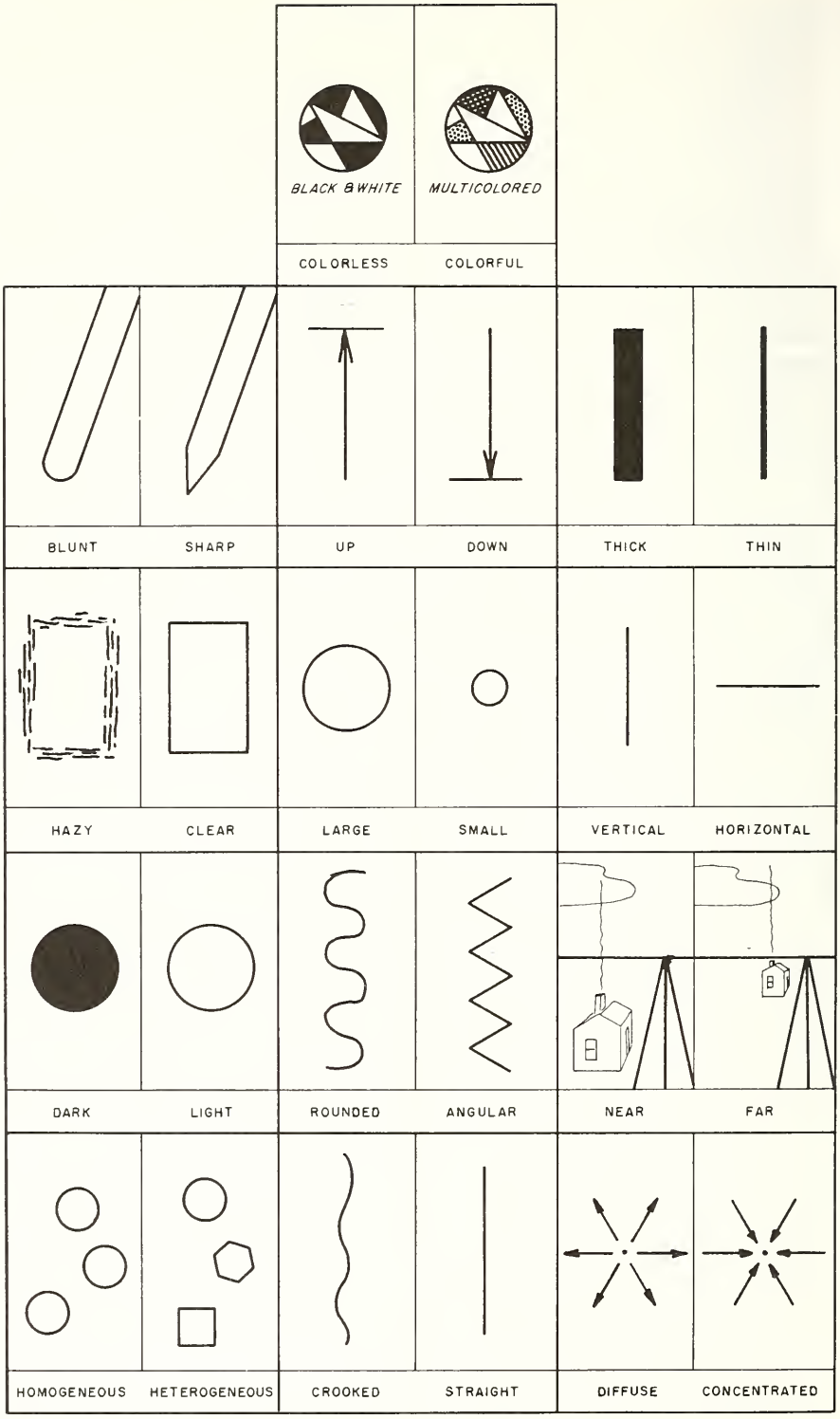


Figure 1. Pairs of Visual alternatives.

same synesthetic (or is it metaphoric?) parallelism was found by Asch in all of the languages he analyzed. Brown, Leiter and Hildum (1957) asked students to describe *operatic voices* by selecting (a) from a list of ten antonymous adjective-pairs and (b) from a set of 20 music-critic-derived adjectives (e.g., *cold, pinched, gravelly, dulcet, voluptuous*) those which best described each voice. Generally, for example, baritones tended to be *dull, heavy* and *thick* as compared to *bright, light,* and *thin* tenors!

The 20-year/30-culture project of our Center for Comparative Psycholinguistics has generated the affective meanings of and attribution of feelings to some 600 diverse concepts, organized into some 40 conceptual categories for statistical analysis, all using carefully equivalent semantic differentials for teen-age males in each indigenous language. It has provided ample evidence for the universality and pervasiveness of primitive Evaluation (E), Potency (P) and Activity (A) features of affective meaning. Given this massive evidence, the prospect for creating a *non*-linguistic *Graphic Differential* seemed bright indeed. At our Center, in 1967, Leon Jakobovits initiated research on developing just such an instrument. However, although this early effort yielded clear evidence for a cross-culturally "universal" E-factor, there was minimal evidence for either "universal" P or A factors. Furthermore, there was clear evidence for what might be called "denotative contamination" — e.g., ANGULAR vs. ROUNDED pictograms separated concepts like *chair, triangle* and *house* from *cloud, smoke* and *snake* — and we concluded that most of the pictograms were too complex, lending themselves to caricatures of real objects.

A few years later, Patrice French, then a graduate research assistant in our Center, picked up this problem. After developing and testing a series of short-form GDs (Graphic Differentials), she came up with a final version that yielded highly satisfactory results (see French, 1977, for details), and there was little evidence of "denotative contamination." Figure 2 presents this finalized GD, with the visual alternatives organized *according to the three affective factors:* note, first, that the clearly *Evaluative* alternatives are verbalizable as *smiling* vs. *frowning* faces, *upward*-directed vs. *downward*-directed arrows, a *living* vs. a *dead* organism, a *growing* vs. a *cut-down* tree, and a *whole* vs. a *cracked* plaque; second, that the Potency alternatives are a *large* vs. a *small* spot, a *thick* vs. a *thin* line, a *solid cube* vs. a *plane square,* a *heavily*-lined vs. a *finely*-lined drawing, and a *densely* vs. a *sparsely* dotted square; and third, that the *Activity* alternatives are an *active* vs. a *passive* signal, a very *jagged* vs. a rather *smooth* descending line, an object *rolling down* a line vs. *resting* on it; an *animated* dot vs. a relatively *passive* dot, and an *in-flight* vs. a *collapsed* bird-like creature.

However, dimensions are *not* presented *in factor sets* in an ordinary Semantic Differential form, and neither can they be presented so in a Graphic Differential. Rather, the dimensions representing the three affective factors must be *mixed in ordering* and, as well, the dimensions for each factor must be *randomly directed,* left to right, within factors — thus, as shown in Figure 3, the $^{+}$E pole sometimes to the left and sometimes to the right, and similarly for the P and A factor dimensions. This Graphic Differential has already been applied very successfully to a variety of subject populations for whom the usual (verbal) Semantic Differential is inapplicable — to brain-damaged patients like aphasics, to thought-disordered schizophrenics, to children younger than about six years of age, and to members of non-literate cultures.

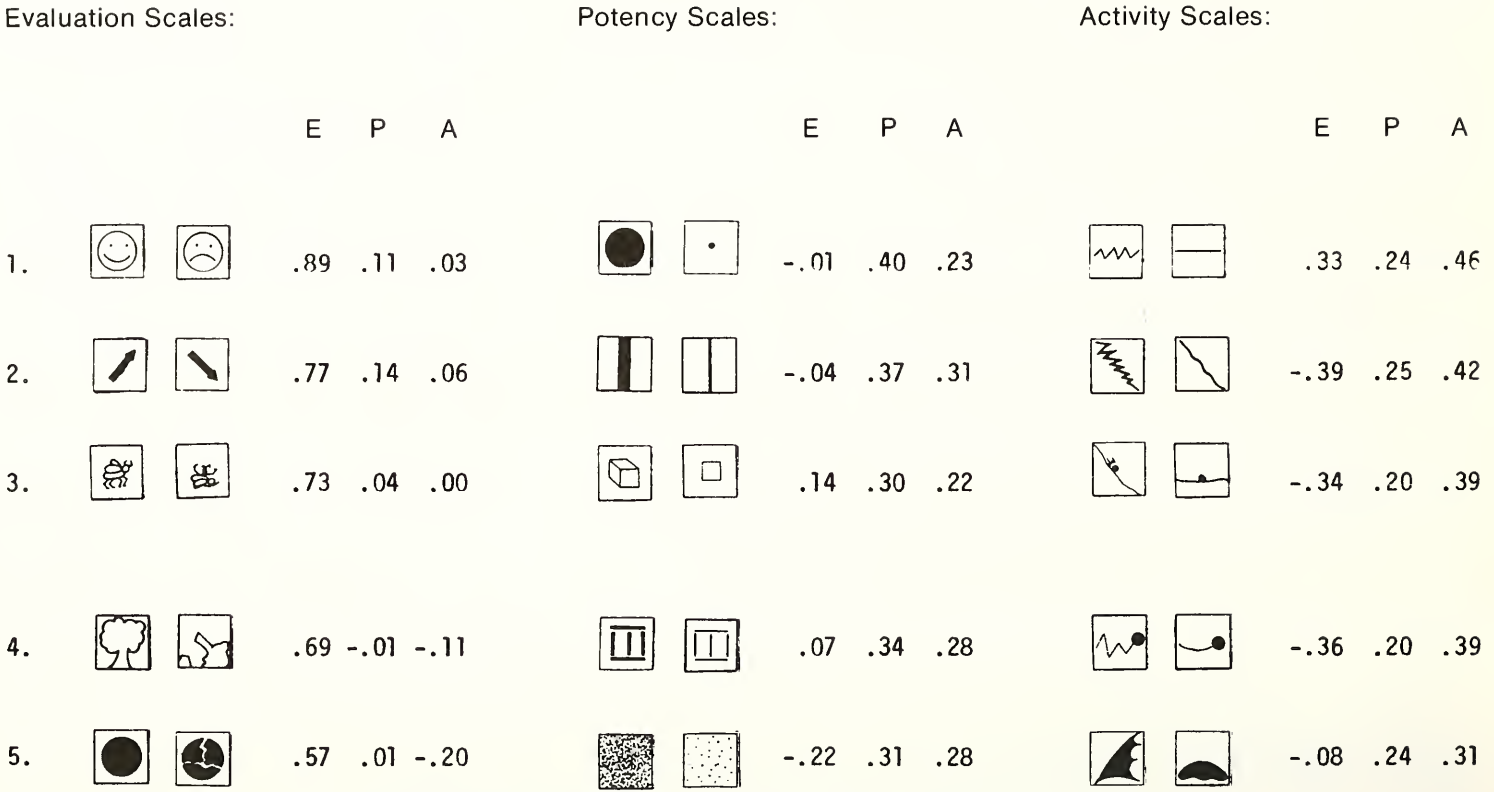


Figure 2. Pictographic Scales for the Graphic Differential Verbal/Nonverbal Scale Score Correlations.

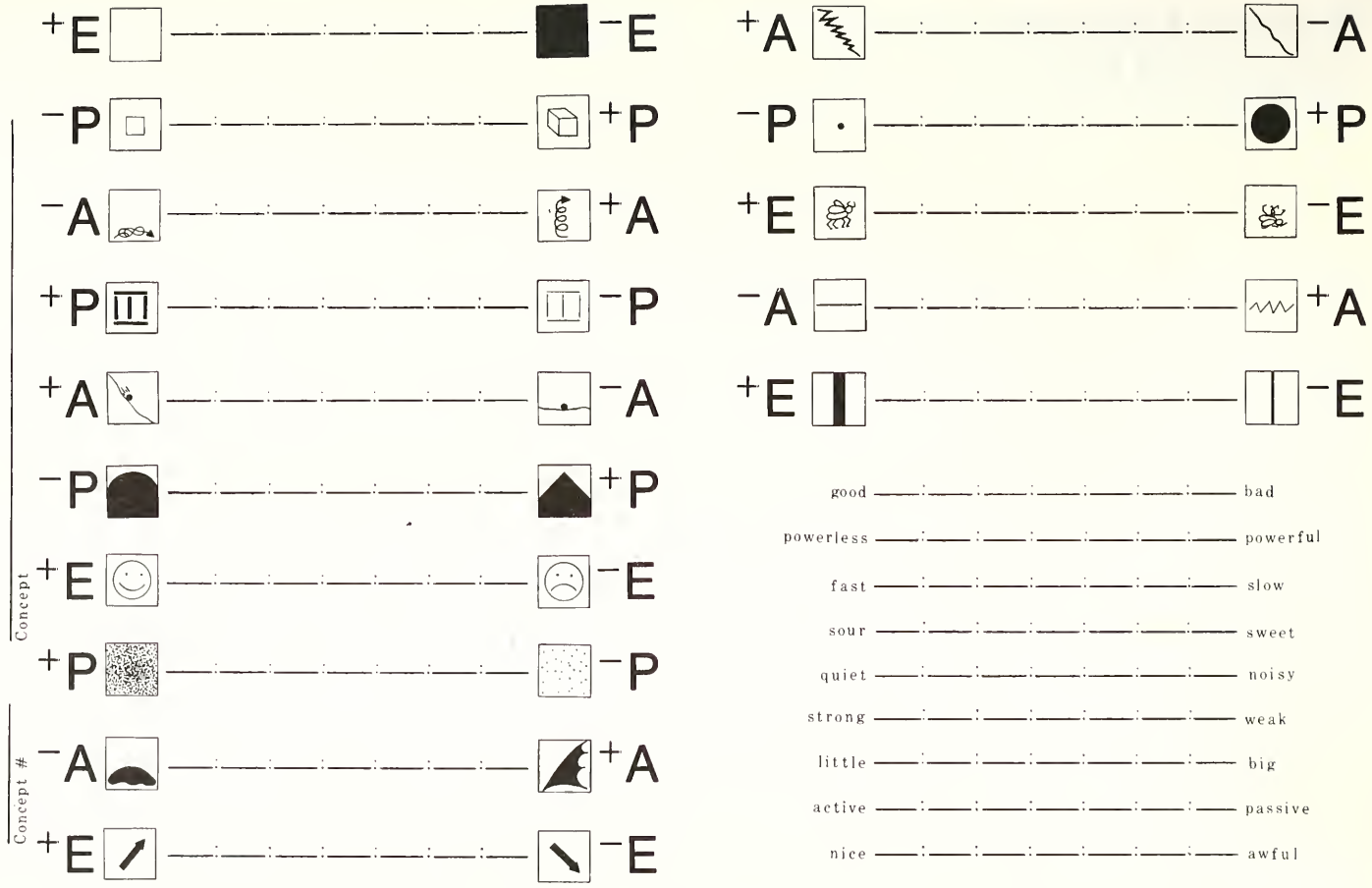

+E −E
−P +P
−A +A
+P −P
+A −A
−P +P
+E −E
+P −P
−A +A
+E −E
Concept
Concept #
+A −A
−P +P
+E −E
−A +A
+E −E
good bad
powerless powerful
fast slow
sour sweet
quiet noisy
strong weak
little big
active passive
nice awful

Figure 3.

The Intimate Parallelism of Perceptual and Linguistic Channels

Here I will first offer two very general principles of Neobehaviorism — and "Emic" Principle and an "Ambiguity" Principles — both of which can be shown to operate in linguistic as well as perceptual channels. Then I'll briefly review some evidence for *interaction between* and for *parallel processing across* perceptual and linguistic channels (see Osgood, 1979b, 1979c, for details).

An "Emic" principle. On the perceiving/comprehending side, we usually have situations where *percepts are variable but their significances are constant.* By virtue of the fact that both things and organisms are mobile with respect to each other, the *percepts* produced by the distal signs of things will be variable through many stimulus dimensions. Thus, for example, the *size* of the percepts produced by APPLE object must *vary* with distance; yet, given the *stable* visual features (roundness, redness, stemness) of the percepts, their meaningful *significance* will be *constant.* It follows that these will be differences that do *not* make a difference in meaning. This constant significance is *the constancy phenomenon,* long familiar to psychologists — the "thingness," "thatness" and "whoness" in perception.

On the behaving/expressing side, we usually have situations where *intentions are constant but the programs for behaving must be variable.* Thus, as the percepts of APPLE object vary with distance, the child will learn to vary his behavior to the common apple-getting *intention* appropriately — APPLE-on-table (some distance away) eliciting locomotor approach, APPLE a bit beyond reach yielding reaching-and-grasping, APPLE at crooked-arm's distance perhaps producing "inspection for bugginess," and only very big APPLE image a few inches from the face eliciting biting movements.

Why do I call this the "Emic" Principle? Because it is the behavioral equivalent of the phonemic, morphemic and sememic principles of linguistics. But even more than this: One can claim that there is a *syntax of behaving* just as there is a syntax of talking, and, of course, the former is prior in development. For a child to make biting, then grasping, then reaching movements in that order — all in thin air — as he approaches the desired APPLE would be just as "ungrammatical" as it would have been for Caesar to have announced "vici, vidi, veni"!

An "Ambiguity" Principle. On the perceiving/comprehending side, signs (linguistic or perceptual) are often *ambiguously* related to more than one significance. Just as many words in a language are to some degree polysemous — witness, as familiar examples, *he went to the BANK, it was a LIGHT one, the SHOOTING of the hunters was terrible* — so too are many perceptual signs, not only classic ambiguous figures like the Necker Cube, but everyday cases like the significance of the facial expressions of men on a picket-line as seen on TV (sullen anger or grim determination?) or of the combination of a tight-lipped smile with shaking of a fisted hand (intent to threaten or to display pride at completion of some effortful task?). On the behaving/expressing side, although the *intention* of the actor/speaker is always unambiguous *to him* at the moment, he will often use the *same* outputs to express quite different intentions — the same smile for pleasure, confidence, or derision, for example.

Given the ubiquity of ambiguity for signs in both perceptual and linguistic channels, why aren't we hopelessly ambiguated much of the time? The answer is that, in most cases, *conver-*

gent contextual signs serve to disambiguate. In language, *he ROWED to the bank, it was a light PLAY,* and *the shooting of the hunters BY THE NATIVES was terrible;* in perception, the tight-lipped-smile plus shaking-of-a-fisted-hand BY A BOXER will be interpreted as "threatening" just BEFORE the fight but as "prideful satisfaction" just AFTER his winning it.

Evidence for interaction between linguistic and perceptual channels. First, *some casual* (but still very convincing) *observations.* Gestural pointings, lookings, head-bobbings/shakings, and the like normally accompany conversations. Gestures often substitute for phrases (e.g., "I could/SLITTING MOTION ACROSS SPEAKER'S THROAT/ the bastard!") or even whole clauses ("They've got our car back in the shop again, so/ . . . PRAYERFUL POSTURE OF HANDS PLUS HEAVENWARD-LOOKING EYES!). It is also most significant that emphatic gestures typically parallel linguistic stress ("I will not!/FISTED-HAND-DOWN-SHARPLY/ wear the ridiculous tie!") and appear utterly ludicrous when displaced from stress points ("I will not wear that ridiculous tie/SAME GESTURE/").

Second, *some evidence for parallel processing across channels.* The most *ordinary* of human communicative competences — and those most often used in research with young children — are Simply Describing and Simply Acting Out. In Simply Describing, the meanings of *perceived* states and events are comprehended and then expressed in appropriate sentences; in Simply Acting Out, the meanings of *words and sentences* are comprehended and then expressed by appropriate facial expressions, gestures and postures. My favorite example here is this: two coeds, walking along a campus path, see a third girl approaching with a *mini*-miniskirt on; after she has passed, one coed says to the other, "She álso dyes her hair!". Note that the use of anaphoric *she* implies an immediately prior cognition (which could only be perception-based) and that the *álso* identifies it as something like [THAT GAL / IS WEARING / A REALLY SHORT SKIRT].

The evidence — experimental as well as casual — supports the following inescapable conclusions: (1) *that the "deep" cognitive system is essentially semantic in nature;* (2) *that this same cognitive system is shared by both perceptual and linguistic information-processing channels;* and (3) *that there is continuous interaction between these channels in ordinary human communication.* Yet, with only a few exceptions (my own research and theorizing being among them), in linguistics and even psycholinguistics there has been relatively little concern with the *semantics* of non-linguistic, perceptual cognizing.

CONGRUENCE DYNAMICS

Now we must look into the role of *cognitive congruence dynamics* in human perceiving, thinking and talking, my second major topic: first the *gross affective dynamics,* on which we have amassed a great deal of information over the past 20 years; second, the *fine denotative dynamics,* where we have less research evidence, but which leads naturally into the nature of metaphor.

Gross Affective Dynamics

There now is no doubt that Evaluation, Potency and Activity, as affective dimensions of meaning are, indeed, *human universals* (see Osgood, May and Miron, 1975, Ch. 4). In the Semantic Differential technique, sets of teen-age subjects in each of (now) 30 communities rated *concepts* (concrete ones like FLOWER, CHEESE, SNAKE, LIPS and TABLE; abstract ones like ADOLESCENCE, ENVY, ZERO, INFINITY, and SEX) against short-form 12-scale differentials, each 7-step scale being de-

fined by bipolar adjectives like *nice-awful* (E), *big-little* (P) and *fast-slow* (A).

Now, since subjects are required to rate *all* items — yielding judgments like *SNAKE* (is) *quite fast* and *ADOLESCENCE* (is) *slightly little* — it follows that in many cases our native speakers are forced to produce "sentences" that would be semantically anomalous. Literally speaking, TORNADO cannot be either *fair* or *unfair* (only humans can have such attributes), so subjects *should* check the middle of the scale (defined as *neither* qualifier applying or *both equally*). *In fact,* most subjects check the -3 position, thus creating a "sentence" which says TORNADO (is) *very unfair!* This is obviously *metaphorical usage* of the scale, — by virtue of the shared affect, both TORNADO and *unfair* being $^{-}$E. In other words, often the SD technique literally forces the metaphorical usage of scales.

In our analysis of each of the 40 or so conceptual categories tapped in our *Atlas of Affective Meanings* we always include a componential analysis in which we intuit the possible *denotative* features that might be determining affect attribution. The small (8 concept) Color Category will serve as an example: Here we "intuited" the obvious physical dimensions and selected appropriate concept-pairs for testing: thus, for Brightness (WHITE/BLACK, WHITE/GREY and GREY/BLACK), for Hue (RED/BLUE and YELLOW/GREEN), for Saturation (RED/YELLOW and BLUE/GREEN) and for a Color component (COLOR/GREY, COLOR/WHITE and COLOR/BLACK).

When we checked for cross-cultural Universals, we found the following: Brightness is universally Good, Active and Familiar as compared with Darkness, but Darkness is more Potent and Conflictual. Since humans are primates and depend much on vision, this pattern of universals seems entirely reasonable. As to Hue, our cross-cultural data strongly confirm that the red end of the spectrum is more active than the blue — RED and YELLOW being universally more Active than BLUE and GREEN, but BLUE being universally the more Good. For primitive man, REDish sun and fire meant warmth and liveliness, but the BLUEs and GREENs were probably associated with life-giving water and the fertility of growing things. Saturated REDs and BLUEs tend to be universally more Potent than Unsaturated YELLOWs and GREENs, and *this* universal may well have a physiologically-based affect determination. Finally, as to the Color/Non-color component, we find that the concept COLOR is universally more Good, more Active and less Conflictual than the non-Color concepts GREY, WHITE and BLACK — which certainly fits our metaphorical uses of terms like *colorful* (attractive, lively, healthy, etc.) vs. *white* and *black* (often pale and sickly or gloomy and threatening).

As part of a larger study on affective relations among our Colors, Emotions, and Days of the Week categories, our Yugoslav colleague, Vid Pecjak (1970), had subjects in seven of our cross-cultural communities pair the terms in each category with those in each other. The correlations between Color and Emotion concepts were quite high across these communities ($^{+}$.63), but those between Colors and Days of the Week were lower ($^{+}$.30). However, there were definite clusters between the Colors and Days. GREY goes with MONDAY for six of the seven communities but never with SATURDAY, GREEN and BLUE tend to go with WEDNESDAY (5 communities) but never with SATURDAY, YELLOW and GREEN go with THURSDAY (5 communities) but again never with SATURDAY — but RED *does* go with SATURDAY (6 of the 7 communities), yet *never* with MONDAY or SUNDAY! — and WHITE, as might be expected, goes with SUNDAY for five of the seven communities.

Now let me say something about *the pervasiveness and primitiveness of E, P and A.* In a 1969 paper I tried to account for the *pervasiveness* of these affective dimensions of meaning by noting, first, the marked similarity of the E-P-A factors to the dimensions of feeling and emotion: Wundt's Pleasantness/Unpleasantness, Tension/Relief and Excitement/Quiet; Schlosberg's Pleasantness/Unpleasantness, Rejection/Attention (P?) and Activation/Sleep; and my own "naming" — in a 1966 study on the semantics of communication via facial expressions — Pleasant/Unpleasant, Controlled/Uncontrolled, and Activated/Unactivated. Then I suggested that it is the *primitiveness* and innateness of this *emotional* reaction system of the human animal that underlies the universality of the affective E, P, and A components of meaning.

Testimony to this primitiveness is the fact that visual-verbal synesthesia does not appear to be lost even in severely impaired *anomic aphasics.* Sylvia Scheinkopf (1970), using mainly the visual graphic-pairs developed in my 1960 study of the cross-cultural generality of visual/verbal synesthesia, clearly demonstrated that such *aphasics* perform very much like *normals* on this task. They could point *appropriately* to visual alternatives for the verbal concepts presented to them, despite their manifest difficulties in naming and work-finding, or even describing the graphic pairs verbally. In other words, these primitive affective aspects of meaning survive even the effects of severe brain damage.

Fine Denotative Dynamics

I must begin with a brief sketch of some relevant aspects of my *Abstract Performance Grammar* (APG), since this will lead to statement of the crucial *rules for fine semantic interactions* in the processing of sentence-like cognitions. Then we will see how such interactions function to shift the meanings of words and phrases. And finally I will summarize just a bit of the most relevant experimental literature.

At the most central Representational (meaningful) Level of my APG, four structural mechanisms are proposed — a LEXICON, an OPERATOR, a BUFFER and a long-term MEMORY — of which only LEXICON and OPERATOR will concern us here. It is LEX which, given the acquisition of meanings via sign- and feature-learning principles in the theory, performs the feats of transducing meaning-less (in themselves) sensory percepts into meaning-*full* code-strips of semantic features in *comprehending* and of transducing meaning-full semantic code-strips into meaning-*less* (in themselves) motor programs for behavior *in expressing.*

Whereas LEX functions on *a "word-like" unit basis* (cf., Osgood and Hoosain, 1974), the OPERATOR functions on a *"whole-constituent" unit basis* (subject and object noun phrases and the verb phrases relating them). Thus, *in comprehending,* the "upcoming" semantic code-strips for word forms from LEX are assigned by OPERATOR to its postulated three constituents for simplexes, utilizing language-specific cues for constituent boundaries. *In expressing,* this process must be reversed, with the "down-coming" whole-constituent semantic information from OPR being analyzed by LEX into sets of code-strips for word units and these being ordered by LEX according to the within-constituent rules of its language for talking via motor-skill programs. At the grossest level of analysis, simplexes are assumed to be *tripartite* in structure. For simplex sentences expressing *stative* relations we would have [the ball (FIGURE) / is on (STATE) / the table (GROUND)] and for those expressing *action* relations [the little boy (SOURCE) / picked up (ACTION) / the poodle puppy (RECIPIENT)].

At the finest level of analysis, the semantic *features* elicited by *Signs*

are assumed to derive from the *overt behaviors* made to *Significates* (things signified). Therefore these semantic components will (1) be *bipolar and reciprocally antagonistic* in nature behaviorally speaking, it is just as impossible to have a simultaneously $^{\pm}m_k$ as it would be to simultaneously open and clench one's hand) and (2) be *non-arbitrarily Positive vs. Negative* (+/−) in the signing of their antagonistic poles. Note that — once meanings are transduced "upwards" via the LEXICON — *everything* that transpires in information processing by this APG is entirely semantic in nature; and note further that the same cognizing system operates *in non-linguistic perceptual/behavioral processing.*

Given the reciprocally antagonistic nature of semantic features, it must follow that, functionally, *within* any constituent of a simplex cognition, *each* semantic feature *can have only one sign and one value at any one moment.* Given this basic theoretical constraint, *the rules for feature fusions,* both within and between constituents, will be the following:

(1) that *same sign* fusions (+/+ or −/−) of *unequal* intensities will yield *intensification* of meaning (e.g., in combinations like *violent anger* or *plead with humbly*);
(2) that fusions of *signed with unsigned* (zero) *codings* (+/0 or −/0) will yield *modification of meaning,* the whole constituent assuming the polarity and intensity of the signed term (thus *lively hope* making the hopefulness more Active and *plead with sincerely* making the pleading more Moral); and
(3) that fusions of *opposed signs* on the same feature (+/−) will yield *cancellation* of meaning or even "mind-boggling" anomalies (like *casual excitement; plead with tolerantly*).

With regard to rule (3), it should be noted that opposed signs only yield cancellations *toward* zero if they are imbalanced (e.g., a +1 fusing with a −2) and that the "true" sense of anomaly should only occur if they are both *polar* and balanced (+3 and −3). We often use such anomalies effectively, as in *he's sure a youthful old duffer!*

Now let's look at *within-constituent congruence dynamics.* With the Semantic Interaction Technique (see Osgood, 1970, for details), the appositeness/acceptability/anomalousness of words brought into syntactic confrontation within noun phrases or verb phrases can be investigated. Using judgments of *interpersonal* verb/adverb and *emotional* adjective/noun confrontations, clearly supportive results have been obtained; for examples: in verb/adverb sets, *attack suddenly* is judged apposite, *attack deliberately* acceptable, but *attack casually* is anomalous; in adjective/noun sets, *sudden surprise* is apposite, *sudden interest* acceptable, but *sudden contemplation* is anomalous.

What about *between-constituent congruence dynamics* in processing simplex cognitions, either linguistic or perceptual? Again, given the reciprocally inhibitory nature of semantic features, it must follow that cognitions as wholes will be *PERFECTLY congruent* only when, for each feature, the *algebraic product* of the codings across the three constituents (e.g., SOURCE-ACTION-RECIPIENT) is *positive* and the *absolute values* (intensities) of the codings are *the same* (e.g., all three constituents being 2 on the feature). And this *implies,* of course, that given the signs and intensities of any two constituents of a simplex cognition on a given feature, the *congruent* sign and intensity of any third component is predictable.

Of course, in ordinary cognizing of simplex sentences *perfect* congruence is rarely the case. And *this* implies that

there will *usually* be semantic interactions *across* constituents, resulting in subtle meaning shifts. Our research indicates that fusion shifts are typically "leftward" — from the "comments" into the "topics" of sentences. Thus, hearing that *Tom / is / a lively guy,* the "liveliness" ($^{+}$A) is likely to be carried into the meaning of *Tom,* but given a negative Relation (*is not*), it may be "dullness" ($^{-}$A) that carries into *Tom.* It is here, of course, that the dynamics of *metaphors* and *similes* will be handled in APG_0, as we will see later.

A general theory of semantic feature interactions and fusions in determining similarity judgments and meaning shifts in a wide variety of perceptual and linguistic materials has recently been presented by Amos Tversky in a paper titled "Features of Similarity" (1977). It is related to the notions I have offered above, but just one of many experiments he reports will have to suffice here. The two sets of schematic faces displayed in Figure 4 were both shown to two groups of subjects.

For Group A, the four faces in each set were presented in a randomly ordered row (*not* as shown here), and the subjects were instructed simply to *partition* the set into two subset *pairs* of faces on the basis of overall similarity. The most frequent partition of Set 1 was c/p (smiling faces) vs. a/b (nonsmiling faces) and of Set 2 was a/c (nonfrowning faces) vs. b/q (frowning faces), the substitution of q (Set 2) for p (Set 1) thus changing the grouping of faces. All this is mute testimony to the dominance of affective Evaluation.

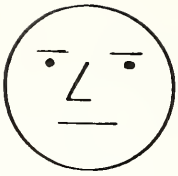
For Group B, the faces in each set were presented *as shown in this slide,* and the subjects were instructed simply to select that one of the three faces below most similar to the "target" face on top. As is evident in the percentages below the three faces in the "choice" set, *face b* was chosen most frequently in Set 1 (but rarely in Set 2) while *face c* was chosen overwhelmingly in Set 2. These results confirm what Tversky calls his *diagnosticity principle* — as well as the dominance of the Pleasantness/Unpleasantness affective factor in facial communication (cf., Osgood, 1966; Cuceloglu, 1970).

A series of papers by Richard C. Anderson and various associates in the Center for the Study of Reading here at the University of Illinois has provided evidence for what they call "instantiation" of particular meanings of the polysemous topics of sentences — and these "instantiations" are clearly cases where certain features of the commentaries move "leftward" into the topics. Anderson and Ortony (1975) found that — given either *the container held the ápples* or *the container held the cóla* — and *then* being given either *basket* and *bottle* as probes, *basket* was a better probe for the former sentences (apples) and *bottle* a better one for the latter (cola). In other words, the "instantiations" of the feature code-strip for the general topic, *container,* had been differentially modified by the "leftward" fusions from *apples* (solid) vs. *cola* (fluid) in the original comprehension of the sentences. Anderson, Pichert, et al. (1976) demonstrated that, for a wide variety of sentence types with polysemous topics, giving the predicted "instantiations" *as cue words* yielded significantly *better* recalls of the remainder of the sentences than the general topic words actually presented originally. Thus, given *the fish attacked the swimmer,* the word *shark* was a *better* cue than *fish;* given *the man planned the house,* the word *architect* was a *better* cue than *man.*

Metaphor

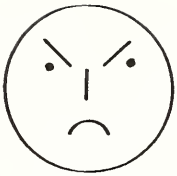
Semantic and syntactic rules are made to be broken. When a Black youngster, accused of a felony, exclaims "Ah ain't nevah done nothin' to nobody nohow!", he is guilty of a quintuple negative at the very least, but his claim to honor-

a



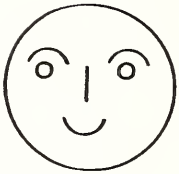
Set 1

b



44%

p

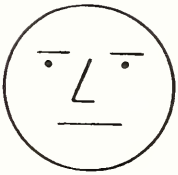


14%

c

42%

a



Set 2

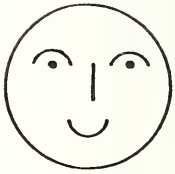
b

12%

q

8%

c



80%

Figure 4. Schematic Faces Used to Test Tversky's Diagnosticity Hypothesis.

able character is being vividly made. However, if rules are to be broken, then there must also be rules for breaking rules. "When I use a word," Humpty Dumpty said, in a rather scornful tone, "it means just what I choose it to mean, neither more nor less." "The question is," said Alice, "whether you *can* make words mean so many different things." "The question is," said Humpty Dumpty, "Which is to be master, that's all." There are grains of both truth and untruth here — being master of one's words is not synonymous with being entirely arbitrary in one's use of them — and, as we shall see, metaphors can vary from the tellingly *apposite,* through the tamely *acceptable,* to the ridiculously *anomalous.*

Metaphorical use of language falls naturally into two sub-types. There are *within-constituent* semantic interactions *in phrasing* — witness Winston Churchill's coinage of the phrase *the iron curtain,* which certainly provided an apt characterization of the Cold War situation at that time. There are *between-constituent* semantic interactions *in sentencing* — my favorite example here is a TV beer advertisement, in which, after dropping bottles of the brew from skyscrapers, running them over with steam rollers, and flinging them against brick walls (with nary a scratch to the glass bottles), the assertion is brightly made that *this beer has indestructible flávor!*

In Phrasing

The smallest unit of potential metaphorical usage would seem to be single-word nouns and verbs. The names of many commercial products provide examples. Just poking around my wife's kitchen cupboard, I find these: *Meritene* (a "protein-vitamin-mineral supplement") and *Rose-milk* (skin care cream), both $^{+}$E; *Ajax* (a cleanser that "bleaches out the toughest food stains"), obviously $^{+}$P; and *Off!* ("keeps bugs away"), rather $^{+}$A. Our frequent exhortations to inanimate entities provide VP examples — *Wake up!* (to a "grumbling" coffee pot in the morning), *give!* (to a "recalcitrant" slot machine) and *charge!* (to one's "idling" car as the light turns to green).

"Live" vs. "dead" metaphors. According to Roger Brown (1958), "the metaphor in a word lives when the word brings to mind more than a single reference and the several references are seen to have something in common." Using *the foot of the mountain* as an example, he points out that, in the fresh use of this phrase, the minus coding on Top vs. Bottom-ness (to coin a feature name!) of *foot* can fuse with *mountain* to yield the apposite bottom-of-mountain "live" metaphoric meaning. Of course, *the foot of the mountain* is no longer a "live" metaphor, but rather one long "dead." However, the same vertical polarity is used in many other (again, mostly "dead") phrasal metaphors, e.g., *he stands at the head* vs. *foot of his class,* but again fresh "live" ones can be generated, e.g., *he's chipper at the head of each day but gets droopy at its foot* (acceptable, even though "temporality" is substituted for "verticality").

Affect vs. denotation based metaphors. While *the foot of the mountain* is primarily denotation-based, *the foot of the class* clearly involves affect (Evaluation). In metaphoric usage many superficially denotative terms actually convey affective feeling-tones: *a warm person* is typically differentiated from *a cold person* in terms of social Evaluation (E), not skin temperature; *a hard guy* differs from *a soft guy* in terms of social Potency (P), not the resiliency of body — and Roger Brown (1958, p. 152) most appropriately observes that "if Disney were to give *a boulder* a voice it would be *bass* rather than *treble*"; and *a quick mind* differs from *a slow mind* in terms of mental Activity (A). The affective-denotative difference

can also be demonstrated by differential modifying of the same nominals — thus compare *affectively* apposite *black traitor, white hope, sweet joy* and *bitter misery* vs. anomalous (but usable, in a mind-boggling fashion!) *white traitor, black hope, sour joy* and *sweet misery* with *denotatively* apposite *disloyal traitor, steady hope, wild joy* and *prolonged misery* vs. anomalous (but again, possible) *loyal traitor, abrupt hope, tame joy,* and *momentary misery.*

The language of international relations (to say nothing of national politics) is loaded with metaphorical phrases. Although many are stultifying — the phrase *underdeveloped countries* is an insult to people whose written histories often go back much further than our own — the dynamics of metaphor also encourage the creation of potentially effective phrases. One could speak of *unevenly developed countries* — implying that some may even be *overdeveloped* in certain respects. The phrase *mutual nuclear deterrence* has a stable, reassuring feel to it — almost like being in a medieval suite of armor; but given its foundations on the shifting psychological sands of mutual fear and distrust, nothing could be much *less* stable or reassuring — and it is refreshing to note that one well-known strategist has dubbed it *the delicate balance of terror!*

In Sentencing

Now I will *detail* the fine semantic interactions involved in *polysemy* and in *metaphor* — separately, because the types of meaning-shifts are quite different: Polysemy involves selection among alternative *existing senses* of potentially ambiguous topics via interactive fusions from commentaries; metaphor involves creation of *novel senses* for topics via the same interactive fusions, in which certain old features may be strengthened or weakened and other new features may be added. Finally, following a brief review of some relevant empirical evidence already available, I will suggest a type of research that might serve to distinguish among the somewhat competitive theories of metaphor that have been suggested by Tversky (1977), Ortony (1979) and myself.

It is interesting that etymologically *metaphor* derives from the Greek *meta* (trans) + *pherein* (to carry), i.e., literally "to carry across" or *transfer* — which, or course, is precisely what my "leftward" fusive interactions of semantic features presume. Rather unfortunately, I think, this *transfer* notion has subtly shifted in philosophical treatments to one of *comparison* between the topic and the commentary. I say "unfortunately" because the term *comparison* implies a deliberate, conscious mental process rather than an automatic interactive process among constituent meanings of which one is usually unaware. However, as Andrew Ortony notes in a paper appropriately titled "Why Metaphors Are Necessary and Not Just Nice" (1975), whether we call the process "transfer" or "comparison," metaphor is necessary if we are to provide a reasonably faithful portrayal of continuously variable states with a language composed of discrete symbols.

The semantic interactions that resolve *polysemic ambiguities* may be either within-constituent or between-constituent. I take some examples from Michael Reddy (1973), the adjectives $ROCK_1$ (derived from the noun *rock,* referring to hard, granite-like substances) and $ROCK_2$ (derived from the verb *to rock* as a rhythmic motion): In *he works in a rock quarry* vs. *he works in a rock band* there is no ambiguity since the *within*-constituent fusion of the features of *quarry* vs. *band* with *rock* yield appropriately different total meanings. In *they are rock idols,* however, the referent status of *they* is ambiguous — but *between*-constituent interaction easily disambigu-

ates (thus, *those musicians . . .* vs. *those monuments . . . are rock idols*). Or witness the multiple idiomatic uses of the simple word *hand:* In the ordinary usages of *lend me a hand, deal me a hand, I got it second hand,* and *he rules with an iron hand* there are no confusions, due to the antecedent contexts; but note the "mind-boggling" effects of mixing the contexts, as in *lend me a second hand* and *deal me an iron hand!*

Particularly interesting are what Reddy has called "conduit metaphors," in which the senses of simple verbs like *have* and *give* are shifted polysemously from Concrete to Abstract. In *I have an apple* and *he gave me an apple* the senses of the stative HAVING and the active GIVING are Concrete, but in *I have an idea* and *he gave me an idea* the senses are obviously Abstract (there is no physical possession or transfer). Reddy's paper provided multitudes of examples — like *none of Mary's feelings CAME THROUGH to me* and *try to PACK more thought INTO fewer words.* He suggests that such polysemy makes it easier for people to communicate their mental and emotional states via language. Imagine — immediately after *you've told* someone "I'm just buying time" — the "mind-boggling-ness" of being politely asked "How much are you paying for it?" (an abrupt shift from Abstract to Concrete *buying*)!

Turning now to the *creation and comprehension of metaphors,* Ortony (1979, c., p. 22) says that "no adequate theory of metaphor can ignore the difference between metaphor and simile." He notes that, traditionally, the distinction has been made in terms of distinguishing between *implicit comparison* (metaphor) and *explicit comparison* (simile). While it is true that when a wife creates the metaphor, *my husband is a teddy bear,* no comparison is directly expressed, as it is when she creates the simile, *my husband is like a teddy bear,* I would suggest that the *psychological* difference between metaphors and similes is primarily one of *intensity of coding of the commentary on exactly the same semantic features.* To say *my husband IS a teddy bear* is certainly a stronger "commitment" by the speaker than to say *my husband IS LIKE a teddy bear* (which is a kind of waffling), and hence the polarization of the "cuddly," "cute," "playful" meanings will be greater for the former than the latter.

As was the case for *within*-constituent metaphors in phrasing, *between*-constituent metaphors in sentencing must *optimally* break semantic rules if they are to be effective, let alone comprehensible. In the literal use of English one cannot say *the thunder shouted* or even *the panther shouted* — only humans can *shout* — yet, speaking poetically, one might well say *the thunder shouted down the mountainside.* However I, at least, could not say *the breeze shouted down the mountainside* — without making it a gale! Note that while *thunder* and *shout* share enough features (like affective Potency and denotative Loudness) to "override" the opposition on Humanness — the fusion, indeed, serving to "humanize" the thunder — *breeze* and *shout* do not.

My suggested rules for semantic feature interaction (presented earlier) generate explicit predictions for potential metaphors and similes. Rule (1): when a feature has *the same sign* (+ or −) in both topic and commentary, equal intensity of coding yields *no change* in topic meaning, greater intensity in comment *increases* polarization in topic, and lesser intensity in comment *reduces* polarization in topic. Rule (2): when a feature is *signed* (either + or −) in the commentary but *unsigned* (0) in the topic, the topic assumes *the same intensity and polarity* on that feature as the commentary. Rule (3): when topic and commentary have *opposed signs* on a feature, unequal codings yield *reductions* in intensity toward zero coding in

the topic, nonpolar equal codings (like +1 vs. −1) yield *cancellation* of that feature in the topic, and polar equal codings (+3 vs. −3) yield the sense of *anomaly.*

Table 1, titled simply *John and Mary,* offers several sets of sentence types which will serve to illustrate the assumed functioning of these rules — the use of *John* and *Mary* as contrastive topics serving to minimally code them on ±SEX and +Maturity. Sentences that are *literally informative* are marked +, *uninformative* (redundant) −, or *anomalous* with an !, respectively. Sentences that are potentially *metaphorical* are marked by signs in *parentheses* — (+) if they are *apposite* (that is, informative via metaphor), (?) if they are *acceptable* but clearly not apposite, (0) if they are simply "mind-boggling-ly" empty, and (!) if they are *anomalous* (that is, incongruously mis-informative). In what follows, we will see how the postulated rules of semantic feature interaction and fusion (here, *across* constituents) would predict the expected effects upon listeners — as checked by your own intuitions, of course!

The first set of sentences (Roman I) are redundantly uninformative since in ordinary English the personal names *John* and *Mary* are already coded for Humanness and Sex — these features of the commentary are already *entailed* in the coding of the topic. On the other hand, those in Roman II are *literally informative,* since new +Maturity and +Cleverness features from the commentaries are transferred to the topics where they were coded zero. In contrast, note that in Set Roman III, while *John is handsome* and *Mary is pretty* are similarly informative via fusion, *John is pretty* and *Mary is handsome* are literally *anomalous,* because *handsome* and *pretty* are coded +Sex and −Sex — thus in opposition to my Rule 3.

We come now to the potentially metaphorical sentences in Set IV. The commentary *is a teddy bear* is clearly *congruent* with the Maleness of *John* because of the *teddy* ?) — and hence the Cuddliness, Playfulness, etc., feature-sets can be informatively fused with the meaning of *John,* riding over the opposition on Maturity; this same Maleness, along with the Immaturity, are equally clearly *incongruent* for *Mary* as a topic, and hence the anomalousness of *Mary is a teddy bear.* Exactly the reverse of course, applies to *John is a kitten* (!) vs. *Mary is a kitten* (+). A similar comparative analysis holds for *John is a bull-dozer:* both topic and commentary are coded Masculine, thus allowing the Potency, Determination and Ruthlessness of *bull-dozer* to transfer to *John,* overriding the single opposition on Humanness. For *Mary is a bull-dozer,* however, the oppositions on Sex and possibly Potency as well, added to that on Humanness, render the whole rather anomalous. The analyses of *John is a sewing machine* vs. *Mary is a sewing machine* would be the same — on the assumption that the "femininism" of *sewing machine* not only fits *Mary* but makes a busy little demon out of her! Either *John* or *Mary* might be *acceptable* as topics for . . . *is a radio* (making them loud-mouthed, gossipy bores??), but the sentences surely are not *apposite* metaphors — hence the (?) rating.

As they stand without any context, the sentences in Set V are "mind-boggling-ly" empty (0) when the features of the commentaries (*paper-clips, formulas,* and *ideas*) are fused with those of the topics *John* and *Mary.* But note that if a prior context *is* given, or even the commentaries expanded, an apposite metaphor can be generated: Thus, for *paper-clip,* either prior sentences about *John* or *Mary* "holding the family together" or an expanded commentary . . . *is a family paper-clip;* and for *formula,* prior talk about either *John* or *Mary* providing exactly the "solution" for the other's family problems.

All of the sentence types so far have

TABLE 1

	JOHN	and	MARY
I	– John / is / a member of the human species		– Mary / is / a member of the human species
	– John / is / a male		– Mary / is / a female
II	+ John / is / a mature male		+ Mary / is / a mature female
	+ John / is / clever (generous, tall, etc.)		+ Mary / is / clever (thoughtful, short, etc.)
III	+ John / is / handsome		! Mary / is / handsome
	! John / is / pretty		+ Mary / is / pretty
IV	(+) John / is / a teddy bear		(!) Mary / is / a teddy bear
	(!) John / is / a kitten		(+) Mary / is / a kitten
	(+) John / is / a bull-dozer		(!) Mary / is / a bull-dozer
	(!) John / is / a sewing machine		(+) Mary / is / a sewing machine
	(?) John / is / a radio		(?) Mary / is / a radio
V	(0) John / is / a paper-clip		(0) Mary / is / a paper-clip
	(0) John / is / a formula		(0) Mary / is / a formula
	(0) John / is / an idea		(0) Mary / is / an idea
VI	(+) John / growled at / the salesman		(?) Mary / growled at / the salesman
	(?) John / purred at / the cop		(+) Mary / purred at / the cop
	+ John / laughed at / the clown		+ Mary / laughed at / the clown
VII	+ John / will make someone / a nice husband		(+) Mary / will make someone / a nice husband
	(+) John / will make someone / a nice wife		+ Mary / will make someone / a nice wife
	(0) John / will make someone / a nice cousin		(0) Mary / will make someone / a nice cousin
	+ John / will make someone / a nice parent		+ Mary / will make someone / a nice parent

involved the simple verb *to be* (is) as the relation of the commentary. However these can be much more complex semantically. Set VI illustrates the potential metaphorical functions of verb phrases, and again the topics, *John* or *Mary,* undergo interaction-based meaning changes. While *John growled at the salesman* would be a literal statement as far as the *salesman* is concerned, *growled at* contains features which, when fused with *John,* make him at least momentarily rather *mean* and *nasty* and even (Dog-like) a bit more Masculine. On the other hand, when *Mary* is the topic we must code the sentence (?) because of this opposition on Sex. Conversely, since *purring* is clearly Cat-like — and hence a bit more Feminine, *Mary purred at the cop* is coded (+) but *John purred at the cop* is coded (?). Both of these potentially metaphoric relations via verb phrases contrast with *laughed at,* where either *John* (or) *Mary laughed at the clown* may have some effect on the meaning of *clown,* but certainly not on the topics *Mary* or *John.*

My last Set VII makes it even clearer that metaphoric interactions between topics and commentaries are by no means limited to simple verb *to be* relations. Note that while *John will make someone a nice husband* and *Mary will make someone a nice wife* are entirely acceptable *literal* assertions, if we *reverse* these object noun phrases we get *metaphoric* assertions that forcefully modify the "images" of both *John* and *Mary* and are in no way "mind-boggling." To say *Mary will make someone a nice husband* actually makes her somewhat Masculine (one imagines her to be rather big, strong and domineering); to say *John will make someone a nice wife,* similarly, makes him somewhat Feminine (one imagining him to be rather *small, weak* and *submissive*). The last two examples indicate, first, that *John* (or) *Mary will make someone a nice cousin* (with *cousin* neutral on Sex and much else) has no such effects, and is in fact quite "*empty*" (0), and, second, that *John* (or) *Mary will make someone a nice parent* is merely *literally informative* and in no way metaphorical.

There is one very interesting thing that appears when informative *literal* sentences are compared with informative *metaphorical* sentences — and I, at least, have seen nothing about it in the literature. This is the fact that, whereas negation of literals serves to cancel (or even reverse) the features embodied in the commentary, negation of potential metaphors apparently serves only to shift them into literal sentences — i.e., *cancels their metaphoric potential.* Negating the sentences I have coded simply + (literally informative) — e.g., *John is NOT clever, Mary is NOT pretty, John did NOT laugh at the clown,* and *Mary will NOT make someone a nice parent* — clearly cancels the meanings of the commentaries as applied to *John* or to *Mary,* and even seems to reverse the codings in some (like *John is not clever* suggesting that he's pretty stupid!). On the other hand, negating the relations I have coded (+) (metaphorically informative) — e.g., *John is NOT a teddy bear, Mary is NOT a kitten, John did NOT growl at the salesman,* and *Mary did NOT purr at the cop* — seem more like literal denials (albeit rather obvious ones) and certainly do not reverse the meanings. And as to negation of my last sentential examples — *Mary will NOT make anyone a nice husband* and *John will NOT make anyone a nice wife* — they are absolutely "mind-boggling," and about all one could say to them (and that after a pause for trying to comprehend) would be "of course, not!"

Now a brief review of *some particularly relevant research* with children and adults. Ortony, Reynolds and Arter (1978) provide a critical review of much of the literature here, of which only a few particularly relevant studies will be noted. Gardner (1974) reports an

experiment which explicitly relates synesthesia to metaphor in children tested in three groups with mean ages of 3.5, 7.0, and 11.5 years. Given sets of stimulus-word pairs, the children were asked to say how the pairs should be related — a test item being, e.g., *blue-red:* "Which color is *cold* and which is *warm?*" Errors (in terms of adult synesthetic tendencies) were shown to decrease with age, with 11-year-olds performing much like adults.

Winner, Rosentiel and Gardner (1976) postulated three levels of development in comprehending metaphors like *the prison guard was a hard rock:* A "magical" level (that the guard was turned into a rock); a "metonymic" level (that the guard worked in a prison with rock walls), and a "primitive metaphoric" level (that the guard was physically — *not* psychologically, at this stage — hard and tough). Whereas children 6 through 8 gave predominantly "primitive metaphoric" interpretations (and even the youngest gave more "metonymic" than "magical"), "genuine metaphoric" interpretations were dominant for children 10 to 14 years of age.

In a relevant adult study, Verbrugge and McCarrell (1977) proposed that metaphors are comprehended only when the *unexpressed* ground between the topic and the commentary is inferred. For example, *billboards are warts on the landscape* will be comprehended only if the ground — here, something like "ugly protrusions on a surface" (i.e., the affective and denotative features transferred from commentary to topic) is inferred. They then predict that *unexpressed* grounds will also be effective as prompts *for recall* of the metaphical sentences. Their results showed that, although topics and commentaries were the best prompts, *relevant* grounds worked nearly as well. Again, whether "inference" of the unexpressed grounds is a deliberate mental process of which comprehenders are aware, *or* is simply the awareness of a particular "fresh" meaning of the topic due to automatic semantic feature transfers, remains a basic theoretical issue.

And, finally, *a proposed experiment on metaphor comprehension.* The purpose would be to see if reasonably precise predictions can be made (and tested) for shifts in the meanings — *both affective and denotative* — of the topics of metaphorical sentences. The predications would come from my own theory, but also (competitively) from the theoretical notions elaborated by my friend and colleague at Illinois, Andrew Ortony (cf. his 1975 and 1979 a, b, c papers) and from the seminal paper by Amos Tversky (1977), titled "Features of Similarity," as extended by Ortony to apply to metaphor. I would, of course, invite Ortony and Tversky to make their own predictions for topic meaning-shifts in the experimental sentences.

For the set of illustrative metaphoric sentences here, I will use only *encyclopedia* as a common topic — there would be a variety of topics in the actual experiment, of course. Hypothetical sentence (1), *an encyclopedia is a dictionary,* is essentially literal, and little topic meaning-shift would be expected. Sentences (2) through (4) — *an encyclopedia is a goldmine / a coal mine / a junk yard* — would be designed to modify topic affective meanings (from $^{+}$E through ^{0}E to $^{-}$E), since, denotatively, all are places where one must "dig around" to find things. Hypothetical sentence (5), *an encyclopedia is an oil well,* is deliberately inapposite, given the conflicting features of "digging out" (*encyclopedia*) vs. "gushing forth" (*oil well*). While the $^{-}$Animate and $^{-}$Human commentary in (6), *an encylopedia is a vacuum cleaner,* strikes me as rather apposite ("sucking up a mass of information"), the similarly coded (denotatively) *chicken coop* in my (7) seems entirely "mind-boggling." And whereas the $^{+}$Animate and $^{+}$Human *professor* in my hypothetical (8), *an encyclopedia is a professor,*

seems apposite (after all, professors *are* collectors and sources of information), the similarly coded *secretary* in my (9), being typically a *recipient* of information, seems rather inapposite.

The measuring instrument for the proposed experiment would be a semantic differential, but one designed to tap more specific *denotative* features as well as generalized affective ones — e.g., scales like *abstract-concrete* (encyclopedias vs. vacuum cleaners), *organized-disorganized* (coal mines vs. junk yards), *animate-inanimate* (professors vs. vacuum cleaners), *giving-receiving* (oil wells vs. junk yards), *simple-complex* (dictionaries vs. encyclopedias), and so forth. One group of subjects (control) would rate *both* topics and commentaries as *isolated* words or phrases on the SD scales; the other group (experimental) would rate *only the topics* and in the *context* of the metaphorical sentences. The control group data would be used to *predict* (via each competing theory) the meaning-shifts of topics — and these *predicted* topic meanings would be evaluated against the *actual* topic meanings, as given by the experimental group in the metaphor contexts.

Although shifts in the meanings of *commentaries* could be predicted and measured, no such shifts would actually be expected. There is a very significant characteristic of *reversible metaphors* that has not been sufficiently highlighted in the literature — namely, that it is the meanings of the *topics* that are shifted, not those of the commentaries (thus the transfer is always "leftward" from comment to topic). Compare *butchers are surgeons* (where *butchers* acquire affective $^{+}$E and denotative $^{+}$Skill) with *surgeons are butchers* (where surgeons become clearly $^{-}$E and very $^{-}$Skill). But note that there is no intuitively detectable shift in *commentary* meaning in either case. Whereas *billboards are warts on the countryside* conveys $^{-}$E and $^{+}$Prominence to the *billboards* with no apparent effect upon the meaning of *warts,* the reversal to *warts are billboards on the face* adds denotative $^{+}$Magnitude and $^{+}$Communication (advertising one's ugliness!) to the already $^{-}$E of the *warts* on the face, again with no felt shift in the meaning of the commentary (*billboards*). It might be noted that in the *encyclopedia* sentence-set (with the possible exception of *a professor is an encyclopedia*) all reversals produce "mind-boggling" sentences — like *a goldmine is an encyclopedia* (!) or *a vacuum cleaner is an encyclopedia* (!). This seems to be the case for many (perhaps most) metaphor and simile reversals. Again borrowing an example from Ortony (1979), witness the effect of reversing the apt simile *cigarettes are like time bombs* into *time bombs are like cigarettes* (!).

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RESPONSE TO OSGOOD

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Professor Osgood's paper is important to researchers in the arts on three grounds:

(a) It provides empirical data to validate intuitive speculations of artists such as Klee and Kandinsky.
(b) It provides for a model to measure verbal meanings and reactions to works of art.
(c) It provides some useful insights into a non-verbal measure of perceptual and visual meanings.

Kandinsky, writing in his classical epic, *Concerning the Spiritual In Art* (1912), speculated on colors which had sounds and shapes. Klee, in his lectures at the Bauhaus, took up the theme of *cross-modality perceptual synesthesias* in his own intuitive speculations on forms which had sounds. The idea of synesthesia was one of the fundamental beliefs of, not only the Bauhaus, but much of the modern movement as well.

As Professor Osgood points out very early in his paper, synesthesias becomes accepted as a more normal phenomena and not restricted to the behaviors of "freak individuals." In this part of his paper it was interesting for me, as a design historian and critic, to see the psychological validation for these ideas which are important cornerstones of the art and ideas of our century.

Many of the design exercises and learning experiences of the Bauhaus Art School, such as texture charts, painting to sounds, etc., have a basis in the psychological concept of synesthesias.

In my own design history courses, I have for the past several years, experimented with playing musical compositions which somehow relate to the perceptual and visual qualities in various types and periods of modern art. The question of "aesthetic equivalences" has always interested me. This concept that lines, shapes, forms, colors, and textures have their aesthetic equivalence in compositions and passages from music, seems to be an important conceptual principle which underlies much of aesthetic and arts education.

Professor Osgood's paper concentrates most of its attention on the *Semantic Differential Technique*. While this method has been developed to measure meaning in a linguistic sense, it provides an important research methodology for work in aesthetic measure studies. Studies in aesthetic preference have been handicapped throughout much of their histories by the use of methodologies which recorded preference in terms of like and don't like. The history of such studies has demonstrated that aesthetic behaviors need to be measured with instruments that are far more sensitive to a wide range of aesthetic qualities. The *Semantic Differential Technique* has been used by researchers in Europe over the past 10 years to give us more reliable readings on aesthetic judgment and preference variables.

In discussing the work on the far less developed *Perceptual Differential Scale,* Professor Osgood indicated the

difficulties encountered, as well as hopes and potentialities for such an instrument. The need for this instrument still persists, and the work mentioned by Pat French should be continued within art education research.

The innateness and primitiveness of this affective meaning system gives rise to important questions in developmental psychology. In this sense Professor Osgood's speculations seem to parallel earlier work by Heinz Werner.

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RESPONSE TO OSGOOD

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The work of Professor Osgood has been familiar to many researchers in art education through his very influential *The Measurement of Meaning* (1957). The acquaintanceship with his work has been principally through the use of the semantic differential technique associated with his research into meaning. His current paper is particularly significant in bringing to a diverse range of art education researchers the essential import of his work; it places the full range of Osgood's research into perspective. The psycholinguistic ideas which he discusses should be of real value to art educators and researchers, particularly when recognizing our dependence on verbal communication, whether in teaching art or assessing aesthetic behavior.

Even though I have used the semantic differential technique and am familiar with its development and theoretical underpinnings, my initial reading and rereading of "The Cognitive Dynamics of Synesthesia and Metaphor" presented some difficulties. However, the presentation of the paper by Professor Osgood made the paper *come alive* and was in the process an apt demonstration of some of the very ideas he was presenting. It is an important paper serving as a state-of-the-art review of some of his major contributions to psycholinguistics.

The semantic differential, (SD), technique has been frequently used as a research tool by art educators, by researchers in the area of environment and behavior, and by social scientists, both here and abroad. Implicit in the use of the semantic differential in assessing aesthetic behavior are the assumptions underlying cognition and perception. These are drawn from Osgood's conclusions in Part I of this paper: (1) "that the 'deep' cognitive system is essentially semantic in nature; (2) that this same cognitive system is shared by both perceptual and linguistic information-processing channels; (3) that there is continuous interaction between these channels in ordinary communication." In effect, when we ask subjects to respond to a painting on a bi-polar adjective scale, such as *good-bad,* we assume that we are assessing or retrieving something of the affective orientation to the work along evaluative, potency, and activity dimensions encoded in the deep semantic space. Invariably, the overriding dimension is an evaluative one whether the stimulus object is a painting or a work.

The great advantage of the semantic differential technique, in studies that might be loosely categorized under the term experimental aesthetics, is that it permits the use of "real" art objects as the stimuli eliciting responses. However, this freedom contains certain problems. Unless great care is taken in selecting art objects as representative of particular properties, the resultant evaluation or assessment of a work is of a very general nature. Thus, while the semantic differential technique may reveal gross affective differences among subjects on styles, greater specificity in definition of response variables is best advanced by use of a synthetic approach to the study of single visual attributes such as Berlyne's investigations of visual complexity. Nonetheless, the SD tech-

nique is very useful in revealing response variables with the further study advanced by the study of single visual attributes.

So the SD technique is particularly useful in revealing the connotative, the universal affective dimensions of meaning. Within this domain Osgood and associates have convincingly established pervasive and primitive affect dimensions of evaluation, potency and activity. These EPA dimensions are found among art as in other concepts. It seems to me that the problem in using the semantic differential as a research tool, particularly in experimental aesthetics, is that the product becomes something of an artifact of technique rather than a contribution to real aesthetic insight along particular theoretical lines of thought. We know that individuals use EPA dimensions in responding to art, at least as revealed in using the SD technique, but we are at the point of asking: So what? Where do we go from here?

The metaphorical use of language, which is an extension of congruence dynamics, suggests both research and instructional relationships to the *talk about art*. Important critical processes, such as the rather classical process of description, analysis, interpretation and evaluation as described by Feldman in *Art as Image and Idea,* or the phenomenological process, as described by Kaelin in Cemrel's *The Guidelines, Curriculum Development for Aesthetic Education,* use metaphorical language in joining the visual with the verbal world. We know very little about individuals' metaphorical use of language relative to the visual arts. In effect, Osgood has, through his insights into the creation, structure and comprehension of metaphors, presented art education researchers with, at least, a starting point in the investigation of metaphorical use of language in communicating about art. Eventually some might find his behaviorist model a bit constraining, but it is a place to begin.

The framework of metaphorical use of language, then, not only suggests that developmental studies be extended to the visual arts, but also that instructional strategies might be developed using the best state of existing knowledge in this area as a means of extending the use of critical processes in art education. We are in debt to Professor Osgood, as we are to solid researchers in other disciplines, for providing insights and tools adaptable to art education research and instruction.

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RESPONSE TO OSGOOD

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As Review Panel members, our task is not easy. In essence, our charge is to provide key linkages from a kaleidoscope of "Osgoodian" concepts and "semantic aerobatics." Let us not fool ourselves. Osgood's paper, though scholarly, is lengthy and difficult to attend to as a talk.

Nonetheless, with careful reading, creative applications and relevancy for visual arts researchers can be suggested. My response will not attempt to explicate scientific application for such relationships, but rather to illustrate one perspective for relevancy. A portion of my research attempts to provide accounts of the methods by which art students assign meaning or interpret meaning from teacher talk about visual phenomena. Metaphoric description, though usually ambiguous and often inadequate, does provide instructional communication for aesthetic phenomena.

As a classroom ethnographer and a researcher of teacher talk and interaction, I am intrigued with Professor Osgood's concept of "non-linguistic cognizing" and the classroom achievement of this level of knowing. I am further intrigued by the complexity of the translation of non-linguistic cognizing to linguistic or descriptive learning equivalencies, or what Osgood has called "perceptuo-linguistic synesthesias." I shall attempt in this response to illustrate how such concepts manifest themselves in the art classroom.

There should be little question that teacher talk about visual art phenomena provides the basic communication tool of studio classroom instruction and evaluation. Nevertheless, aesthetic understanding can occur without reaching a level of verbal interpretation. Aesthetic phenomena are nonverbal and evade verbal equivalency translations. It is indeed the skilled teacher who can communicate aesthetic values through talk or lecture.

It should not be surprising for us to discover that the student's primary learning objectives center around the discovery of situational cues (or what Osgood would call "convergent contextual signs") to provide increasing clarity of meaning for that which is spoken in relation to the visual work being produced. This cue searching behavior reduces the degree of talk ambiguity and, in essence, is the basic evidence teachers will use to determine whether or not aesthetic learning has taken place. In other words, the student's ability to grasp the meaning of aesthetic terms and concepts, his ability to use such language and his ability to demonstrate evaluative application of such criteria to his work are the essence of success for any given classroom context. Though this may seem all too simple an explanation, my research would indicate that these processes are often the taken-for-granted and rarely attended to essence of the art teaching/learning dynamic.

Students engage in both subconscious and systematic searching for "convergent contextual signs" to clarify ambiguous terms and abstract concepts. The study of this ongoing interplay among ambiguous communi-

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cation, situational cues and aesthetic understanding would seem initially better suited to case study methodologies which allow for the controlling variables of time and context. Yet it appears to me that the investigation needs to stop there. Semantic differential testing seems quite possible for future studies.

The very term "semantic differential" appears to be in contrast to the visually oriented person, and consequently, less than inviting to the visual arts researcher. I urge reconsideration and offer a note of encouragement. This process is indeed quite natural to that which we do both as artists and as teachers. Interestingly enough, the semantic differential technique is a basic mechanism that students usually employ to assign aesthetic value to that which is being produced in the studio classroom. Individual and informal semantic differential scales help students to assign evaluative and potency meanings to a teacher's classroom appraisals or utterances about studio products. Students select contrasting verbal descriptors of negative to positive equivalency, then interpret the degree of negative or positive equivalency for each statement made in relation to their work. I call this process "continuum ranking behavior." These student rating systems are comprised of contrasting polarity achievement pairs. As an example, consider the following typical ones:

TABLE 1

(plus)	+	to	−	(minus)
wonderful	——	to	——	horrible
fixed it	——	to	——	ruined it
better	——	to	——	worse
he likes it	——	to	——	he hates it
favorable	——	to	——	unfavorable
correct	——	to	——	wrong
interesting	——	to	——	boring
good	——	to	——	bad
"neat"	——	to	——	"yuckie"
A+	——	to	——	D−

Invented expressions also serve in this capacity. Consider for example the pre-schooler whose semantic differential scale bridges "oou" to "ickey." Though not a sophisticated use of metaphor, the differential is sufficient as a means to rank the work in positive or negative values.

Without question, our profession could profit from extended research to gain knowledge and awareness of the ongoing interplay between potentially ambiguous aesthetic and metamorphic descriptors and the aesthetic learning process.

For the sake of brevity, allow me to simplify the studio appraisal behavior into "private" and "public" appraisal stages. At least three types of "private" appraisal precede "public" dialogue about the work. These are:

(1) Boundary patrolling of the conditions or the antecedent criteria related to the task assignment;
(2) Forecasting and anticipating outcomes, and
(3) Aesthetic experiencing or arousal produced by the emerging work.

Although these processes are generally meant to be "private," students still will search for non-verbal appraisal cues to assess a teacher's state of affect toward the work during moments of direct encounter. At some point, the teacher decides how much communication about the work he is able or willing to disclose through gestural or spoken language. The studio teacher is faced with a bewildering task of selecting appropriate terms for conveying his aesthetic judgment, in essence, translating his visual knowing to metaphoric communication. During a critique, the student assumes his task to be that of assigning a positive or negative value to the terms or phrases that the instructor utters. To do so with any degree of accuracy, he must have shared understandings of the terms

and concepts which are the topic of discourse. This is not an easy task in the initial weeks of a new course.

Allow me to illustrate this point. The following utterances were recorded during the initial meeting of a drawing course. The statements were made in reference to slides of work completed by students who had taken the course previously. They are typical of the semantic referents (italicized) usually used in studio classrooms. Consider both the potential ambiguity for the beginning level student as well as the implied differential value scale assumed by the teacher:

TABLE 2

teacher utterance	implied differential + to −
"This one is *nice — real direct*"	(spontaneous-to-overworked)
"Lots of *nice stuff* going on in this one!"	(nice stuff-to-boring stuff)
"This one has *real efficiency* of line."	(simple-to-too complex)
"This one is a bit too predictable."	(surprising-to-trite)
"The darker elements are a bit too *localized.*"	(balanced values-to-unbalanced)
"This is the *nicest* drawing I think I ever got from a student."	(outstanding-to-worst)

Though as an experienced teacher, I can anticipate an implied differential criteria, consider the difficulty the beginning student has in interpreting what is meant by "nice stuff." Consider, as well, that teacher classroom talk is uttered as neutral and serves simply to describe what is being perceived. This neutral value range causes the students to be confused as they continue to attempt to differentiate positive or negative assessment to such utterances. In addition, each teacher employs unique language adaptations which are not so easily translated into differentials. Consider the following:

"The imagery is haunting."

"This one *falls apart a little.*"

"The color is *particularly strange.*"

"This one *works better,* it's *fairly complex.*"

"There is *really nice closure* going on here."

We can see that even in this sample episode students could easily be confused between the use of "real efficient" and "fairly complex," which appear to be opposite, and yet are both delivered as positive judgments. If the words or the topic of appraisal is ambiguous, meaning and production applications for the talk are difficult to determine. Hence, the initial learning task for the beginning student is to gain a knowledge of the way in which the teacher employs such specific terms as "nice stuff," "real direct," "localized color," "falls apart a little," etc. Initially, the student may have just the hint of favorable of unfavorable judgment, but the comprehension of the meaning of specific terms or criteria will generally be somewhat ambiguous. As a student participant in this case, I wrote the following in my field notation log:

> Mr. Allen showed eight drawings and spoke of the qualities he admired in them. It helped me to grasp a sense of the product expectations for the course. One drawing was called, "The best he'd ever gotten from a student." My impression was that it was incorrect in terms of anatomy; however, I did establish that the course would emphasize a spontaneous and direct approach. (As the samples were shown, I wrote the following descriptors on my sketch pad cover): fuzzy, loose, sketchy, smear, non-academic, non-modeled, impressionistic, gestural, positive-negative, textural, vehicle for drawing qualities rather than subject for drawing.
>
> (Field notation, 6/22/76)

My selection of descriptive terms reflects a negative affect of a personal assessment of the example. Nonetheless, the selected value terms were employed as pointers which guided my attention, as student, toward phenomena and sensuous qualities that would be relevant to successful studio production within this particular context.

We assume that the apprentice artist is naive in his awareness of the sensuous elements that make works "better." Language can help students discover those sensuous phenomena. For instance, a frequent expression employed by Mr. Allen was "nice stuff." With repeated reference to "nice stuff," a student formulates a visual typification of what is meant by the phrase. Ambiguous value-laden terms become clearer as courses evolve.

Subconscious cue searching of the visual referents that accompany appraisal talk contribute toward a tacit learning. That is, aesthetic knowing is a result of an inductive process which is motivated to reduce the ambiguity of value reference terms. The flash impressions that are associated with the value term soon build to an aesthetic typification of the aesthetic concept or qualitative isolate which was spoken in the interaction. This learning activity results in a *visual knowledge,* which is different from linguistic knowledge. This knowledge has often been associated with intuitive knowing: "feels right." It is strongly anchored in the subconscious, and as such, often finds itself lost to the student's explicit awareness or beyond his range for verbal description.

As part of the validation for this assertion, I asked "key informants" to define the meaning of certain terms often used by Mr. Allen. In reference to the term "predictable," one student responded, "I really have no idea what he meant by that." My interview question served to focus her attention to a key term which she had not yet found meaning for. As a consequence, she engaged in a more conscious effort to discover an interpretive meaning for the term. That this did occur is evident in the following interaction recorded a few weeks later with two students:

> Me: When Mr. Allen showed those slides, did it tell you anything about how he will judge our work?
> Lynn: He doesn't like predictable things. (giggle) Brad and I started laughing when he used the word.
> Me: Because I had asked you what he meant by that word a week or so ago, and you didn't know.
> Lynn: Yeah, it's — I know exactly what he means by it. It's — It's . . .
> Brad: (Brad interrupts with "predictable." (laughter follows)
> Lynn: (laughter) Well, it's really the best word for it — Well, it makes the distinction between a 'decorative' and an 'aesthetic' pattern.
>
> (Student Respondent, 2/18/77)

Value terms or expressions such as "nice stuff" or "too predictable" can be assigned meaning only in terms of the context for which they are employed. Such contextually-bound terms or expressions are referred to as *indexicals.* Learned meaning is achieved when an indexical label triggers some qualitative visual equivalent in the interpreter's mind.

When ambiguity exists in classroom encounters, most students are willing to accept the ambiguity under the presumption that the meaning will become clear over time. This gives teachers a false sense that students already understand, because unclear information is allowed to pass while clarifying information is sought. Convergent contextual signs are sought over time to fill the ambiguity of indexical expressions.

Although this audience's initial reaction to Professor Osgood's paper may have been to dismiss the methodology as being appropriate only to linguists, the importance of gaining understanding of this dynamic cannot

be over-stressed, for it is the essence of what art teachers regard and acknowledge as aesthetic learning.

If one does acknowledge the importance of this dynamic, it follows that visual arts researchers should begin to concern themselves with at least the following research objectives:

1. to understand the potential role of appraisal talk in the total instructional experience;
2. to know that there are alternative approaches to critical talk about art;
3. to understand the nature of student interpretations of teacher talk about art;
4. to understand the effective use of talk about art in studio teaching;
5. to become aware of the ways students learn terms and concepts related to visual phenomena.

Let us now return to the task at hand. I found it interesting to note that Professor Osgood's early undergraduate interests explored the possibility of bridging anthropological data with psychological techniques. Those of you familiar with what I promote as *Triangulated Inquiry* may sense that I would indeed be receptive to the triangulation of my findings through an application of semantic differential techniques. If Professor Osgood would respond by suggesting methodological applications, the relevancy for his complex techniques might be perceived as having stronger potential for more visual arts researchers. I conclude with this challenge and solicitation.

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RESPONSE TO OSGOOD

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My initial response to Professor Osgood's presentation is a recollection of my excitement upon first encountering his work while I was a graduate student. The title of one of his major books, *The Measurement of Meaning,* reflects the dream of quantifying the qualitative which has inspired hundreds of studies employing a semantic differential. This instrument, as developed by Osgood and his colleagues, allows people to indicate the degree to which a concept is expressive of an attribute, or of its opposite, by checking one of five to seven intervals separating pairs of bipolar adjectives. Although most of the experiments they reported involved rating the meanings of words, Osgood, Suci, and Tannenbaum (1957) discussed a number of instances in which a semantic differential was a means for measuring responses to visual material: Tucker's application to paintings and drawings, Osgood's investigation of differing responses to color changes in several nationally advertised products, and his continued probing of the meanings associated with various colors as these were superimposed on reproductions of nonrepresentational sculptures. Because the rating instrument reflects affective or connotative similarities among either the objects being rated, and/or the people doing the rating, Osgood, in this early publication, recommended it as a technique for the development of tests of aesthetic appreciation and communication. Thus, the attraction for many of us who are curious about people's aesthetic responses was, at first, a utilitarian one. The technique offered the possibility that we might learn not only that certain groups of people regarded specific works of art as better than other ones, but also what qualities, such as controlled or uncontrolled, they associated with these evaluations. This kind of information, obviously, is useful in a discipline which hopes to educate values.

However, Professor Osgood's address at this symposium challenges us to consider possible relationships of his conceptual and theoretical bases to the study of the visual arts. He reminded us that a semantic differential demands a metaphorical use of the scales, responding to a particular color as hard or soft, for example. The primacy of metaphorical responses, and to some extent, of cross modality perception in his theory of cognition, may recall for many of us the pedagogical practices at the Bauhaus where students in seminars might consider which colors corresponded to the circle, the square, and the triangle. Pap (cited in Neumann, 1970) recalled one of these sessions: "They were just discussing yellow. Someone said it reminded him of the high twittering of the blackbird, and yellow paint seemed close to the triangle. Klee replies that the yolk of an egg was yellow, too, but still circular" (p. 79). This kind of thinking resembles the Odbert, Karwoski and Eckerson (1942) study which Professor Osgood related. He spoke of a rather remarkable consistency among the colors named by people when they were asked which ones seemed appropriate for several excerpts of classical music. This finding confronts us with the question of whether these consistencies indicate that the respondents were using the color/music relation-

ships as cliches, or stereotypes. Osgood (1964) defined a culturally stereotyped concept as a substantive to which many subjects give the same response. In the discussions of such possible associations at the Bauhaus, I assume that it was the act of focusing upon these relationships that was valued rather than any agreement at which the students arrived. Can agreement become so general that it no longer is metaphor? If so, how can we recognize such a transformation? Langer (1951) provided a theoretical guide for the distinction in her discussion of metaphor as the source of generality in language. She maintained that frequent use caused metaphors to lose their power to evoke intervening symbolic images; in her example of a rumor running through the town, we no longer think of leg action. She adopted Wegener's designation of such a word as a "faded metaphor" along with his argument that "faded metaphors" constitute the basis of our literal language. Thus, she maintained that "Only the novel predication can be metaphorical" (p. 124). In her construct, the Bauhaus discussions appear to have been generating metaphors, but the consistency of the colors chosen to be associated with certain musical compositions suggests a transformation in the metaphorical process. In the first instance the associations may be thought of as forming new meanings which, in a sense, are still in the future; in the second case, the relations of the colors to the music probably were linked in the past so that their discovery is a kind of archaeological one. Langer (1951) described the history of metaphor in the development of language. She wrote: "Every new experience, or new idea about things, evokes first of all some metaphorical expression. As the idea becomes familiar, this expression 'fades' to a new literal use of the once metaphorical predicate, a more general use than it had before." So she conceived of metaphor as "forever showing up new, abstractable *forms* in reality, forever laying down a deposit of old, abstracted concepts" (p. 125). Most of us make a pedagogical distinction, as well, between metaphors and clichés. Teaching students that "Yellow is a happy color," or that "Lines that turn down are sad," is asking them to think in stereotypes (Langer's "old, abstracted concepts"). Of course, art education may be conceived of as a means of transmitting such stereotypes; however, since, among other reasons, this kind of information may be regarded as superfluous because, presumably, it already has been learned from the culture, most art educators view their role as that of encouraging the creation of new metaphors.

There is an overt resemblance between some of Itten's teaching methods in his basic course at the Bauhaus and the bipolar adjective pairs which compose the usual semantic differential instrument. Itten (1975) wrote:

> Finding and listing the various possibilities of contrast was always one of the most exciting subjects, because the students realized that a completely new world was opening up to them. Such contrasts are: large-small, long-short, broad-narrow, thick-thin, black-white, much-little, straight-curved, pointed-blunt, horizontal-vertical, diagonal-circular, high-low, area-line, area-body, line-body, smooth-rough, hard-soft, still-moving, light-reavy, transparent-opaque, continuous-intermittent, liquid-solid, sweet-sour, strong-weak, loud-soft, as well as the seven color contrasts. (p. 12)

His pupils not only listed such contrasts but produced drawings and montages which represented them. It is easy to imagine that these art students from the 1920s would have felt quite comfortable in responding to a semantic differential instrument. Both systems are evidence for the structuralists' faith in the power of oppositions to clarify.

The art historian, Gombrich (1963),

maintained that contrasts "would not be so effective if we all were not inclined to categorize the world around us in such basic emotional metaphors" (p. 140). So it is not surprising that he presented models of Osgood's semantic space in *Meditations on a Hobby Horse* and in *The Sense of Order.* Indeed, Gombrich (1963) discussed assumptions underlying the expressionist theory of art by contrasting the extremes of expression vs. communication.

EXPRESSION	COMMUNICATION
of	of
EMOTION	INFORMATION
works through	through
SYMPTOMS	CODES or SIGNS
which are	which rest on
NATURAL (and unlearned)	CONVENTIONS

He used a diagram which simplified Osgood's semantic space to illustrate that it suggests "a natural code of equivalences that represents, I think, the core of the expressionist argument. Every colour, sound or shape has a natural feeling tone just as every feeling has an equivalence in the world of sight and sound" (p. 59). However, he contended that the principal weakness of the expressionist theory of art is its inability to account for structure because "whatever message unstructured blue on a blue canvas may convey to the applauding critic is not inherent in the blue paint like a fluid or essence, but derives its meaning from its shock effect, its unexpectedness" (p. 60). His conception is similar to Langer's (1951) construct of context and novelty as the elements of discourse: the context, seen or stated, modifies a word and determines its exact meaning, but it is the novelty which we are interested in expressing, and the context makes this possible. Professor Osgood demonstrated the tension between context (which determines the expected) and novelty in the examples he gave which classified metaphors along a dimension of apposite, acceptable, and anomalous. He further modified these dimensions by differentiating between primarily denotation-based and affect-based metaphors. While his instances are verbal, the categories suggest some applications in the visual arts. Can we consider Claes Oldenburg's limp electrical appliances and gargantuan lipsticks to be affectively anomalous metaphors? Are Marilyn Levine's ceramic "leather" jackets and suitcases denotatively anomalous metaphors? Was soft sculpture, at one time in the history of art, a denotatively anomalous metaphor? Certainly by now it has moved into the acceptable or even apposite realm for most people (the Oldenburg and Levine works probably are shifting in a similar direction). Of course, artists are aware that they are working metaphorically and, usually, they seek the deviant metaphor (Osgood's anomalous). Indeed, if I were to generalize these dimensions of metaphor to correspond with occupations, I would expect artists to prefer anomalous metaphors, while critics favor acceptable metaphors, and the authors of how-to-do-it books might consider only apposite metaphors. The latter seem very close, if not corresponding, to "faded metaphors," or cliches.

Professor Osgood, in discussing the Harris (1979) experiments, recognized this issue when he distinguished among "live" metaphors, "dead" metaphors, and non-metaphors. The finding of a significant trend for recall-errors that were meaning-preserving to be less metaphorical than the input sentences, may have profound implications for responses to the visual arts. Does the indication that metaphoric effects are ephemeral hint at the renewed appeal of great works of art? Do we remember them as shifting toward "everydayness" so that new encounters are perceived as fresh metaphors? Such an explanation would give pri-

macy to metaphors, not only in creating works of art, but also in responding to them.

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NATIONAL SYMPOSIUM FOR RESEARCH IN ART: CONFERENCE OVERVIEW

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Orientation

This symposium will have long reaching effects on our study of child development in art, as well as on our study of art itself. For these reasons, we are indebted to the University of Illinois and the institutions within it that supported the work. Particularly, we are most indebted to George Hardiman and Ted Zernich, whose dedication to furthering research and whose multidisciplined perspectives led to the design and implementation of the program we enjoyed.

The overall focus has been on graphic expression as metaphoric figurative language. It has brought the study of child development in art, which has had a sporadic and inconsistent development over the last hundred years, into interface with the larger question of the nature of graphic expression in terms of semantics, perception and cognition. Biases towards perceptual realism in Western culture have been examined in terms of other structural equivalents.

Each speaker has pioneered a particular area of inquiry. Each one has focused on different aspects of the central theme. Our task, as members of the symposium, is to try to see how each research focus may relate to the other and to an even larger framework of research related to the subject. This task can only be touched upon in a short review that also attempts to draw implications for the field of art education.

First we must acknowledge that any given researcher has to set limits. They have to focus on researchable topics and build on them. People like Arnheim and Osgood, who have consistently and thoroughly researched their topics over many years, have been able to build broader bases for their inquiry. Osgood had a background in both anthropology and psychology before becoming a psychologist specializing in the cross culture structure of linguistic and graphic meaning. Arnheim has focused much of his work as a psychologist in the arts. In his presentation Arnheim has dealt with only a small part of his lifework, while Osgood has drawn on many aspects of his. To compare their work, far more of Arnheim's work needs to be reviewed.

The other researchers have built a solid basis of work in child development. Gardner and Winner and their associates in Project Zero are developmental psychologists concerned with art. Golomb is a developmental psychologist whose interest is in symbolic formation which includes children's drawings.

The larger field of this subject includes research in art education, cross cultural psychology, anthropology, and experimental aesthetics. People in these fields address questions that are also variables in some of the phenomenon we have been addressing. These include the effects of learned cultural values, the symbols and complexity of visual detail that express these values, the contribution of these visual qualities to the learning environment of children, and the selective motivation of certain categories of people to excel in graphic expression.

A comprehensive review of all the work in child development in art, in all the contributing fields, needs to be made to fully understand the implica-

tions of this symposium. In my review of the conference, I will try to set our field and its relation to psychology in this broader context. In a way, it reflects some of the interdisciplinary concerns of Martin Engel in his comprehensive opening address.

Let me digress a bit to let some of our younger members know my background, which influences this present review. As an art student of Archipenko's in Chicago in 1939, I was exposed to the influence of the Bauhaus school being transplanted there at that time. Their central mode of inquiry was multivariant problem solving in design — part logic, part intuition. Later in the fifties I worked on my doctorate at Stanford, where a multidisciplinary foundational base was required: anthropology, educational sociology, philosophy, as well as a concentration in psychology. This included study of the Gestalt psychology and field theory where wholes are seen not as the sum of the parts but rather the total dynamics of the whole of all of the parts. Comprehensive examinations included these areas, as well as an area of specialization.

My own research focused on perception and psychosocial factors that would affect performance in drawing and design in classroom learning situations. The main purpose of my Perception Delineation Theory I, II, and III, as it has developed over the years, was to help teachers deal with the complexity of teaching diverse students various aspects of human behavior in and through art, and the continuing need to feed related interdisciplinary research findings into the teaching process as they developed (McFee, 1961, 1970; McFee & Degge, 1980).

As some of my older colleagues know, I had the temerity to question Lowenfeld's theory of child development in art twenty-three years ago, because I felt not enough questions had been asked. In New York in 1957, I met a young man named Kenneth Beittel. I had my new dissertation in hand, which he read and asked if his advisor could see as well. The next morning I was invited to meet the great Viktor Lowenfeld. He said I had made important observations, raised new questions, and he thought that we were in our infancy in understanding child art. I doubt if many people felt that this was his evaluation of progress in this area of research.

Please keep these perspectives in mind as you respond to the following review of the ideas of our major speakers. Many of my observations have been picked up by the panels responding to each paper; so some of this will be review. But there are also some questions that come out of my particular interdisciplinary background and experience. I will review briefly each address, make some comparisons between them and then begin to think about implications for our field.

Howard Gardner and Ellen Winner

Gardner and Winner posit that child development in art has a regular progression which follows a U-shaped curve. From a high of being expressive and original at age four, to a low of being conventional and predictable by age ten, only those who go on to become artists become more expressive and original again and rise to another high. In other words, the U-curve holds for those who become artists, but for the other children expressiveness and originality only go down with age. This work is very substantial, extensive and thorough. But there are some questions we must ask ourselves as we, as a special interest group, use their findings.

Is child graphic art solely the result of psycho-physical development patterns? Would living in different visual environments, with different cultural styles in art, or other cultural definitions of what is accepted as art influ-

ence child development? What effects do learning in perception and in art have on development? What are the factors that enable some types of people to go on to be artists and not others? Do some cultures generate more creativity among their members than others? Gardner and Winner alluded to these cultural factors, particularly in the discussion that followed their presentation.

I am reminded here of Wayne Dennis' work with children in Beruit concerning varying degrees of variation from strict to less strict Moslem training (Dennis, 1960). The longer children experienced the more strict Moslem value of not symbolizing the human figure, the more their scores on the Draw-A-Man test decreased from normal acceleration as established in non-Moslem countries.

Also we need to ask how much it is chronological age or the social context of a given age that most affects children's art at a given period, such as the ten year old child. What are the differences in external influences that affect the four and ten year old, such as peer influence and rewards for verbal rather than visual excellence in school? What is the relative impact on child behavior of six more years of experience compared to six more years of physical and psychological maturation? Can maturation and experience be separated?

Perhaps most important, what are the effects of different kinds of learning? For example, when the child of ten is asked to draw like a four year old he or she may be drawing a stereotype of a young child's work and not be tapping what may be a latent ability to be freely expressive. We would need to experiment with varying the time, motivation and social reinforcement to see if the ten year old can reuse his or her prior abilities to be expressive and original. I realize that I may be missing some very fundamental understandings of developmental psychology when I ask these questions, but as an interdisciplinary art educator concerned with ways to stimulate creativity and expressiveness, I have to ask them.

Also, I would like to ask questions about the artists at the adult end of the U-curve. Are all great artists deliberately asymmetrical in the organization of their work or are some intuitively achieving asymmetrical balance at a preconceptual level or synthesis, which the less affected four year old may also be doing? Another question I find unanswered is how they identify and measure the degree of intentionality of children compared to adults. The question about the nature of what is "good" adult art is far from resolved. Though, as these researchers report, Goodman has done much to try and analyze the components of some aspects of art, we are far from identifying universals about adult art. If we are talking about child development in art as if it were free from cultural influence, then the adult art used as a comparison also needs to be universal and not culturally influenced.

Also, questions about development which consider originality need to be related to studies on the nature of creativity and creative development. My own study in which academically superior 15 year olds significantly increased their divergent originality scores on paper and pencil tests by being rewarded for unusual responses in the production of art, needs to be replicated with younger children to see if their behavior can be changed as well. We need to know how much performance can be affected by instruction (McFee, 1968).

Claire Golomb

Claire Golomb reported on the methods she used to analyze child development in symbol-making. She wanted to find out if a pattern of development existed and the nature of development if it occurred. She also evaluated the

methodology and findings of Kellogg and Freeman by contrasting their work with her most careful research.

She asked children to draw from free recall and observed their sequencing. Then she gave them new sets for proceeding. Most children draw the figure beginning with the head; so she asked them to begin with the legs. This led to much more detail in their drawings. Uninstructed toddlers who drew scribbles without visual controls, used visual controls when asked to draw specific things. They apparently brought both memory and visualization into play. She found that children could verbalize more details than they could draw. Their verbalizations were about their experience with the environment rather than their visualizations. Since her sample was from a highly verbal, rather than visual society, it would be interesting to see what would happen if the study was replicated in a society where much more stress was made on visualization.

Kellogg assumes that psycho-physical growth is the most central factor in the child's art development and not affected by experience. Yet as we have seen, Golomb was able to help children remember more images by reversing sequences, and scribblers were encouraged to symbolize by being asked to draw specific things.

This indicates that children do learn from their environment, whether using verbal or visual modes of communicating about it. For example, a half Eskimo, half white young woman raised in a remote Alaskan village by white culturally oriented parents, was in a class I taught which examined our differences in learning to see. She recognized that she didn't see as an Eskimo, and her visual environment for learning was bleak. Both her verbal and visual development in dealing with visual qualities of things appeared limited, but she was clearly very intelligent.

Golomb also found that growth patterns had gaps; growth was not as smoothly sequential as Kellogg's model indicated. Also, we know much more about Golomb's sample of subjects than Kellogg's, who was working with the drawings from her vast collection rather than samples of specific groups of children working under controlled conditions.

Golomb also retested Freeman's work upon which he developed his theories of cognitive deficiencies as the reason for differences between children in responding to his paired figures. She felt that his figures were not appropriate for children to judge. The question as to the appropriateness of drawing figures for different samples of children should also be considered. Just as it is difficult to make culture-free IQ tests, it may be difficult to create universal visual tests, not only in the familiarity of subject matter but also in the amount and kind of detail used. Osgood cited French's attempts to construct a graphic differential which was value free.

One question that neither Golomb nor Gardner addressed was the differences between children's drawing from memory and drawing from observation. Twelve years ago, Lovano-Kèrr studied elementary school age boys' drawings from memory and from observation and found they scored differently (Lovano-Kerr, 1969). Those drawing from observation had much more detail and more advanced spatial organization in their drawings. Also, she found a consistent increase in modal scores through the elementary grades, but the range of development increased with each year, with the lower end of the range changing very little.

When we compare the work of Golomb to Gardner's, we find that they are asking quite different questions about the same phenomenon. Gardner and Winner are more concerned with

the relation of child art to certain qualities of adult art, or at least some types of adult art which they clarified for us on questioning. They are more concerned with the affective qualities of art rather than changes in the use of graphic detail which concerns Golomb.

For these reasons the work of Golomb and Gardner can't be directly compared. Both make most important contributions to our understanding. Also, there is much room for research in the interface of these two kinds of inquiry. For example, what would happen if Golomb's methods were used to interject expressive qualitative suggestions to children? Would this change Gardner's results?

Development in art, as I see it, involves more than the psychobiological. It includes the nature of the visual-physical environment the child grows up in and the way people who share a cultural value system select or motivate the making of an artist. Boys are motivated far more than girls in many societies. The role of drawing in the culture may affect children's development. In some societies it is important to be an artist; in others it is not. As you remember, Dennis found that children had the highest IQ scores on the Draw-A-Man test in societies where there were high incidents of drawing and painting of the figure (Dennis, 1966). Whether the kind of learning stressed is more visual or verbal is critical. Some of Dennis's highest scoring children were from Japan, where figure drawing is a major art form. Also, the fifty year old study of Orotchin children showed they had highly developed perceptual skills which they needed to survive. Food, shelter, clothing came from reindeer they had to closely observe, as they stayed with the herd in their nomadic life. These children had not seen drawings before. Ten to twelve year olds drew reindeer in perspective but people as tadpoles in the same drawing. Selective perceptual development seemed apparent (Schubert, 1936). This opportunity appeared to affect their drawing. These two studies suggest that when perceptual learning is stressed either by exposure to art or critical observation, drawing development is increased.

This does not mean I reject or question Golomb and Gardner's important, careful work. It is just that I do not think we, as educators, can accept the variables they controlled as the only factors involved as we devise implications from their research for practice. Children who grow up in similar environments and value systems clearly are more conditioned to follow somewhat similar growth patterns than children from different environments and value systems. But growth involves differentiation even within similar cultural physical environments. So we need to know from developmental psychologists what *patterns of development* they discover and the *range within patterns* even when studying children from one culture. In practice teachers have all kinds of children in school. Since by tradition, children are grouped in schools by age, each class has much diversity. The assumption that biological age is the most important determinant of change in behavior is too simplistic a basis for assessing children's readiness for given tasks in art.

Also, we must recognize the great wealth of research on cognition, cognitive style, on perception and on the eyes themselves as selecting expressions of the brain. All these point to the complexity of the human organism as it sorts and organizes information. The more differentiation ability is exercised the more complexity it can sort and organize (Gregory, 1977; Cole & Scribner, 1974; Roy & Schwartz, 1978; Haver, 1978).

Arnheim's clear description of the layering effect may well be what we are talking about. Some developmen-

tal psychologists work with younger children whom they assume to be less affected by culture, and thus hope to discover universals which are more fundamental than culture.

But at the other layer of Arnheim's construct, cultural learning and learning during culture change, goes on for life. We teach art for lifelong learning, and with greater learning more differentiation takes place. Even though we may share a culture, we all learn it somewhat differently. Most people apparently have a need for cultural identity or conformity to cultural norms but also need a sense of independence from the norms. In the same way, growth is both patterned and differentiated. Norms can be reported to show both central tendencies and variations from it. We need both kinds of information for teaching art.

Charles Osgood

The background paper of Osgood's presentation, which was sent to me before the conference, was a review of the trends of his work over the last forty years. There is much material that would be invaluable to us in the visual arts and art education for understanding art as a form of communication. Much of his work is with verbal semantics, the meaning of the written and the spoken word. But he is also interested in the semantics of non-linguistic metaphors — messages that substitute for things or events and do not use language as form.

He reviews the small amount of research on graphic differentials to study the ways meanings are carried across from idea to graphic metaphor. By contrast with research on the verbal, he says study of the graphic is in its infancy.

One of his basic principles in dealing with the visual is that "Percepts are variable, but their significances are constant." In other words, we can perceive an object from multiple viewpoints, and its appearances will vary, but the meaning does not.

Artists could make a contribution in this analysis. For us, the significance may be the visual appearance itself. If we were viewing an apple, its size would vary with its distance from us, and that may be what is significant to us. Osgood says the change in visual size of an apple is variable, but the constant is its roundness and redness which are its significances. Our question is, "Can the change in size modify the significance of its meaning in the color of an object?" Don't artists weaken the intensity, that is, the "thingness" of the color, in areas of lesser importance to strengthen the impact of a more important object shown with greater intensity? We also know that either the field of an object or the viewpoint of a non-round object can change the nature of visual metaphor. We think it could change the affective meaning, just as the quality and kind of lettering can modify the meaning of a linguistic message. For example, car illustrators, when bigger was better, foreshortened drawings of smaller cars to make them look bigger.

These are areas that would need to be considered as a graphic differential is developed. If all the kinds of configurations could be handled — almost dreamable with a computer — the underlying systems that produce variations in significance might be identified.

Another interesting area in which we could use Osgood's work is to analyze children's drawings to see which of them draw visual images, and which conceptual metaphors. His work on the interaction between perceptual and linguistic channels may give us help in working with students who have not developed enough in one of these channels. Analysis needs to be made of Osgood's obvious sexist stereotyping which may have influenced the categorizing of some of his results. It may not hold as strongly, since these

stereotypes are changing, as is their influence on children's behavior.

These are but brief examples of the many points where our interest in communication in art and child development in art can profit from Osgood's work.

Rudolph Arnheim

Thirty years ago I ordered a book from the University of California Press. I can still vividly remember the excitement I had when I began to read *Art and Visual Perception* by Rudolph Arnheim. It was my first entry into a long time interest in the relationships of perceptual psychology to art, and interest in Arnheim's work.

In his presentation to this meeting he has raised two points. *One,* he questions what he considers to be ethnocentricism in Western concepts of art in which we assume that realism is the natural form of art and other forms are deviations from that. He would have us consider that perspective realism is the distortion. *Two,* he posits that the materials used are the strongest determinants of style.

A central question underlying Arnheim's work is whether bioptic perception in humans and the information processing of the eye and brain lead to more conceptual or more optical realism in peoples' expression of their experience. This question was raised at the turn of the century by Boas in his study of ethnic arts. He proposed that we could not tell whether objective realism or abstraction came first in cultural evolution (Boas, 1955, pp. 64-87). What he called abstraction and what Arnheim calls cognitive metaphor appear to have considerable overlap. Boas's work also is supportive of Arnheim's point that the materials available or selected have a strong impact on the styles developed.

Arnheim supports his position with examples of:

— selective content in a scene.
— use of the most characteristic aspects of a thing rather than its appearance in foreshortening.
— portrayals of more than the outer surface of things and of one thing surrounding another.

Arnheim adds some critical and important dimensions to the perceptual-conceptual controversy in art. Resolution of the question needs to be sought in terms of cross cultural, as well as, Western traditions, which Arnheim is doing in his analysis of art in different periods by different peoples.

If Arnheim is right and representational realism is not the central reality of drawing style with all other drawing styles being variations from it, then the task of identifying the major differences in style must be undertaken. Then those of us interested in child development in art would have to see if young children are moving toward the style of their own group or not. In 1931, Anastasi and Foley studied the drawings Boas had collected from Northwest Coast Indian children, and they found that the cultural factors were the dominant determinants in style (Anastasi & Foley, 1936). Very little work has been done since that time. But Arnheim has now raised the question from still a different perspective, that of the world of art itself, and he does so cross culturally. In conversation after his lecture, Arnheim said his point was not that children should not learn to observe, but rather, that realism was not the only structural equivalent they might be working toward.

There is evidence that experience can interfere with the use of perceptual evidence. Bruner and his associates show that not only culture but the differences in living in rural or urban areas predispose people to depend more on their conceptual knowledge or their percepts of things to solve

problems (Bruner, 1966). They found that urban children, faced with so much visual complexity, tend to depend more on what they know; rural children depend on what they observe. It is interesting to note that, when non-Western rural children are put into Western schools, they tend to depend less on solving problems perceptually and more on solving them conceptually. It would appear that this dominant value in Western education of conceptual learning using words, is different from the emphasis on realism in art by others in the society, which Arnheim questions. It seems to me that Arnheim is saying that in many societies graphic expression is used to express concepts and feelings more than geometric perceptions of things.

The emphasis on conceptual learning, which Bruner identifies, may be an important factor in the decline in artistry of fourth grade children found in the Project Zero studies. They were not equating artistry with use of realism, but the emphasis on conceptual learning, using linguistic tools, may be a factor in development, either towards realism and/or artistry, because it tends to channel percepts and concepts into linguistic rather than graphic expression.

Implications from this Symposium

One of the most important things we need to consider about classrooms is the variability teachers must deal with. Developmental psychologists are interested in the patterns of change over time and look for the average or central tendencies of change within cultures. Differential psychologists look for individual differences and the ranges of variability in development. Anthropologists look for value and behavioral patterns that identify different groups. Experimental aestheticians are trying to find out the fundamentals of human response to things called aesthetic. Cross cultural psychologists look for the differences in patterns of perception and cognition between cultures. Ideally, art teachers need information from all these groups. They need to know the central tendencies in behavior that differentiate a second from a sixth grade class. They need to know the range that they may find within a given class, in all the behaviors in art, even before mainstreaming is considered. The higher the grade, the greater the *range* in all the behaviors involved in art. A sixth grade teacher may have children drawing at norms from primary grades up to high school. They may have a class composed of representatives of one or many different cultures whose experiences in and through art vary.

As I have briefly reviewed this conference, I have tried to raise questions that could make the material more applicable to our field. We need an exhaustive review of all the research in these many fields that help us understand art as metaphor and children's development in it. Osgood and Arnheim have substantially contributed to the first, and Gardner and Golomb to the second. As art educators, we must develop the tools for bridging the gaps between such researchers' questions and ours, using their work only as we can make reasonable linkages.

Certainly we need to look long and hard at Osgood's findings and Arnheim's penetrating questions. We are all culture bound, to some degree, to Western realistic art, perhaps — or in our attempts to break out from it. Both are conditioned by cultural experience.

Now, to finish I would like to make a few observations of highlights of the last few days. The clear focus of the Symposium, the concentration of the work, the quality of the key speakers' presentations, peoples' attendance and involvement, the composite of ideas presented, were all most impressive. I could not in any way hear all the individual presentations, but I did hear

some exceedingly professional papers. For example: the critique papers on Project Zero by Rush and Lovano/Kerr were excellent examples of the practice of criticism by art educators, the Wilsons' analysis of cultural interventions that they find appearing at different times in the history of children's drawings, and the theoretical paper on the use of metaphor by both teachers and students by Kuhn and Hutchins pointed out our need to consider the teaching-learning domain of art education, not just the learner. The panelists who reacted to the speakers each brought careful, thoughtful questions into the dialogue.

The highlight of the conference, for me, was the interaction panel of the speakers, under the gentle hand of Harry Broudy. Clarifications, modifications, and contrasting points of view were constructively dealt with in a warm climate of mutual respect for individual inquiry.

This conference has not only set an example for our field in terms of concentration and level of inquiry, but also of interdisciplinary cross fertilization of ideas. We all are indebted to the designers and directors of the symposium and to all who contributed and participated in it.

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