

Empirical Structures of Mind: Cognition, Linguistics, and Transformation

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Based on a specially developed methodology, derived empirical findings are presented which when subjected to certain procedures generate a set of cognitive and psycholinguistic operations and structures similar to those suggested by Piaget in cognitive development, by Levi-Strauss in structural anthropology, and by Freud in dream mechanisms. These structures include inversion, negation, permutations, matrix, and harmonic structures. A brief critique of the fields of cognitive psychology and linguistics in relation to the type of data utilized is outlined. Finally, implications of the findings are discussed in relation to language, semantics, methodology, and theory.

On the basis of previous empirical research, the purpose of this paper is to suggest that there exists specific cognitive and linguistic processes which, when subjected to methodological procedures, generate what can be considered structures of mind. While the term "mind" in the recent past, and indeed even now, is highly suspect in psychology, with the increasing development of cognitive studies the term seems to be on the ascendancy as a shorthand expression for a system of cognitive relations reminiscent of gestalt principles. The term does, however, still imply a body/mind dualism, which the data presented here do not suggest. *I am using the term "mind" to refer to a system of cognitive, sensory-motor operations, relations, and transformations, mediated by contextual and linguistic processes.*

With a specially developed method of analysis and validation (Haskell, 1978, 1982, 1983), psycholinguistic data that appear by all conventional standards to be literal productions can also be analyzed as symbolic, figurative, metaphorical, or what will here be termed *subliteral* productions. Further, additional analyses performed on subliteral pieces of verbal behavior yields logico-mathematical type functions and structures similar to those demonstrated by Piaget (1962) in his research on cognitive development, by Levi-Strauss (1963, 1966) in his research into the structure of myths, and by Freud (1961) in his analysis of dream-work mechanisms. Finally, analyses

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performed on subliterate pieces of verbal behavior yield findings similar to the psycholinguistic/affective operations demonstrated by Werner and Kaplan (1963) in their classic work on the development of cognition and symbolization.

In general, the assumptions and linkages connecting the above research are that: (1) the form of linguistic productions is largely affect-determined; (2) linguistic productions are context-determined; (3) they are heavily non-consciously determined; (4) they are symbolic in meaning; (5) they are heavily determined by cognition; (6) metaphorical type productions have cognitive implications; and (7) there exists in linguistic productions primitive psychological structures. All of these linkages place the above researchers somewhat outside the frameworks of most contemporary (psycho) linguistic theories and models of cognition,¹ but directly within the framework of the present paper.

Werner and Kaplan (1963) suggest that "language, by its very nature as an instrument of symbolization, is directed towards the construction of forms . . . that are in dynamic analogy with their referent." More importantly perhaps for the findings to be presented here, they conclude that ". . . most abstract words emerge from a concrete sensory-motor-affective origin . . . [and] it is our belief that what is true of words is most probably true of syntactically expressed relations" (p. 60, italics added). As the findings of this paper will suggest, many linguistic productions exhibit the connecting assumptions and linkages stated above along with those quoted here by Werner and Kaplan.

A classic though admittedly simple example of an affect-to-structure transformation process is the holophrastic expression, as when an insult is experienced and linguistically expressed as a "slap in the face." That affect is somehow transformed into semantic symbolization is not an entirely novel idea, but that syntactic and other type structures develop from an affective substrate, if not entirely novel to poets, is certainly novel to linguistics, psycholinguistics, and to the field of cognitive psychology. Thus, the purpose of this paper, in part, is to illustrate these processes and to comment on their implications.

In my research into linguistic productions (to be illustrated below), I have repeatedly found not only transformations from the affective mode to semantic productions, but also to syntactic productions, integrally transforming into higher order "constructivistic" (after Piaget, 1970a) matrix or lattice

¹Levi-Strauss is an anthropologist who through the analysis of myths claims he not only is studying but has discovered the structure of mind (see Haskell, in press). He is generally considered one of the fathers of a method called structuralism (actually a number of methods). Piaget (1970b) too is considered a structuralist. Outside of Piaget, the approach called structuralism is little known or utilized in American behavioral science (see also Riegel and Rosenwald, 1975). For an excellent introduction to structuralist thought, see Gardner (1972). The methodology on which this paper is based, although independently developed, is related to the structuralist approach.

structures. These subliteral cognitive and linguistic transformations include the following: (a) reversal structure, (b) inversion structure, (c) permutation structure, (d) spatial structure, (e) syntactical structure, (f) mathematical structure, (g) matrix/lattice structure and (h) harmonic structure.

Subliteral Production

Subliteral structures emerge from pieces of discourse that function similar to what are called speech errors (Fromkin, 1973) and slips of the tongue (Freud, 1960). They can also be viewed as non-conscious "metaphors," or "figures of speech." This type of data has historically been very "soft" and "fuzzy." When subjected to a controlling methodology, however, their *logical operations* become evident and replicable.

The term "subliteral" is used here instead of the terms "symbolic," "metaphoric," or the even fuzzier rhetorical term "figurative," for two basic reasons. The first is that the other terms have come to take on surplus meaning, and as a consequence behavioral scientists have come, and perhaps rightly so, to be suspicious of them. The second and by far the more significant reason, is an epistemological one. The terms "symbolic," "metaphoric," and "figurative" imply a "hidden meaning," because they assume only one real literal level of linguistic meaning which requires no "interpretation." Linguistics is almost totally dominated by this epistemology, as indeed is most behavioral science research. With the term subliteral, I am assuming an epistemology that ideally sees all verbal statements as having more than one "level" of meaning. There is no reason to assume that the "consciously" intended meaning of an utterance is the primary (and literal) one. "Subliteral" is therefore a transitional and compromise term.

The following are a few attenuated examples of the type of subliteral linguistic productions that are the basis of these higher order structures: When conversation is recorded, the literal discourse may "just happen" to be about "speakeasies," or the "F.B.I." and "C.I.A.," or in response to a perceived insult, the literal discourse may be about "pierced" ears; or when *two* particular discussants are of concern, the literal talk may be about "twins," and subsequent references to "2s" increase. Such verbal productions are not coincidental, but are systematic and systemic. Subliteral topics do not "just happen" to occur; they are selected-in to the discourse. Speakers select-in topics that are either isomorphic to the discourse situation or they select-in topics that will allow them to covertly express affective concerns.

On the surface such pieces of verbal discourse have characteristics no different from any piece of literal language. Speakers are not aware that ostensibly literal productions are anything other than literal. The "deep structures" of "internal representations" (after Fodor, 1974) are affective and subliteral. The affect is generated by overtly unexpressed conscious and/or

non-conscious concerns the speakers feel about their situation.

For years this type of verbal behavior had been occasionally noticed by researchers in the fields of small group dynamics, and in group psychotherapy, but little had been made either methodologically or theoretically of such pieces of anomalous verbal data outside of their sporadically being recorded (see Bales, 1970; Bion, 1959; Farrell, 1979; Foulkes and Anthony, 1957; Horwitz and Cartwright, 1952; Mann, 1967; Mills, 1964; Slater, 1966; Whitaker and Lieberman, 1964; Yalom, 1970.² But it is precisely this type of anomalous data that provides a psycholinguistic window into cognition and mind. The subliterate findings presented here are conclusions drawn from the analysis of verbal protocols generated in a small group dynamics laboratory. Because of space limitations, no attempt will be made to explicate the methodology on which the conclusions are based. It should also be pointed out that the fact that the data were generated in a small group laboratory has no direct relevance to the generalizability of the findings, as identical findings can be found in "normal" discourse situations.³

Subliterate (affective, symbolic, metaphorical), or what I have elsewhere termed analogic (Haskell, 1978) thought and cognition function in a concrete mode, but nevertheless are capable of expressing quite abstract relations. To use Levi-Strauss' words, concrete thought "thinks with things." But it is not the "things" that are selected-in which are of consequence; rather, *it is how these "things" are used; it is the operations and transformations performed on the content, that constitute the structure of thought.*⁴

²This type of verbal production, sporadically noted by the above researchers, has been termed (a) fantasy theme analysis, (b) latent communications, (c) symbolic equivalencies, (d) anonymous contribution, (e) collective projection, and (f) parataxic distortion. The scheme that has been advanced to explain the "why" of its origin is Freudian "transference." It does not, however, explain the "how" of its production, or offer a method of validation. The interpretation of such "latent talk" is both intuitive and global, its meaning is "given." Recently Farrell (1979) conducted experimental groups varying the "deviancy" in the group and thus correlating the subsequent subliterate productions. But the pre-experimental problem of recognition, analysis, and validation of such phenomena was established simply by an interjudge reliability method: an intuitive-global method, again, only raised to a higher power, so to speak.

³While the small group laboratory is not relevant to the basic nature of the findings, it is an ideal research tool for access to and an analysis of cognitive and linguistic processes, both psychologically and methodologically. First, it is primarily a linguistic medium; second, the discourse is free-floating and associational; third, the group situation is disorienting and confusional, leading to a significant degree of affective and cognitive regression; fourth, the control and manipulation of the discourse is possible; fifth, the historical evolution of the discourse and its context is at the researcher's disposal; and finally, an audio and/or video record is available which can be transcribed into a protocol.

⁴The term transformation is used here in the mathematical sense, not in a linguistic one. As Riegel and Rosenwald (1975, p. 190) point out, linguistics unfortunately uses the term transformation to refer to variance. For example, variation of syntax, changes of declarative into interrogatory sentences, etc. In mathematics, transformations maintain invariance of a system: classes remain the "same" although their labels have been changed.

Historical Considerations

In lieu of a lengthy methodology, it is appropriate, and perhaps necessary, to briefly consider some of the problems and divergent approaches in the fields of cognition and linguistics which influenced the epistemological basis, and thus the methodological approach of the findings presented here. Over fifty years ago, Sapir (1921) pointed out a fundamental research flaw in linguistics and the psychology of language: namely, both over-emphasized the psychophysical and otherwise microconstituents of language. Following Sapir, Whorf (1956) took issue with what he saw as hair-splitting and irrelevant distinctions and the writing of grammars that only grammarians read. For both Sapir and Whorf the essential question of linguistics is *meaning*, an area little advanced today in either linguistics or psycholinguistics, despite the current interest in generative semantics.

Chomsky's (1957) format method of linguistic structure has little use in language instruction. The linguists' emphasis on syntax and psycholinguistic study of what might be termed microsemantics has, likewise, little relevance for most psychologists. In Chomsky's early writing, syntactic structures were considered to be separate from the semantic level. But as Green (1972) points out ". . . the only purpose of syntactic rules is to express semantic relationships . . ." (p. 191). Despite the current emphasis on generative semantics, the notion expressed by Green and others has not proven empirically productive, at least not on an everyday level. Blumenthal (1975) appropriately has pointed out that the "psycho-" has basically been left out of psycholinguistics, and calls for a return to a Wundtian approach. It was Wundt's belief that the study of language provides one of the best approaches to knowledge of mind (p. 152).

Blumenthal also points out that, in the more than seventy years that have passed since Wundt wrote on the subject, many of Wundt's ideas in cognitive psychology and psycholinguistics have re-emerged today: ideas such as creativity, rhythmical grouping in cognition, surface and deep structure difference, and volitional processes. Despite the pragmatic shortcomings of the "formal" analysis of language, even Chomsky (1968), as evidenced by the very title of his book *Language and Mind*, believes that the study of language will provide an access into the structure of mind.

The field of sociolinguists appears far more advanced in terms of language and meaning than psycholinguistics (see Cicourel, 1973; Gigliolo, 1973), chiefly because it studies actual speech production in a social context, along with the serious study of figurative language. In Chomsky's reigning theory, sentences are de-contextualized and have only literal meaning. Should a sentence have more than one meaning, then it is termed ambiguous and anomalous. The question of metaphorical utterances is not considered.

As one linguist has pointed out (Di Pietro, 1978), "If linguistics is to make

important strides . . . it will have to move to a study of how man uses his emotive as well as his cognitive powers to build and change the artifact he calls grammar" (p. 6106). Both past and recent research into standardly defined metaphorical utterances by social, cognitive, and experimental psychologists (e.g., Anderson, 1964; Asch, 1958; Billow, 1977; Hoffman, 1980; Nash, 1963; Wallach, 1958) suggest the cognitive import of metaphorical utterances.⁵

Similarly, the formal, decontextualized, and non-affective approach found in linguistics is paralleled in the field of cognition, as demonstrated by the reigning information processing computer-model approach to mind. Like linguistics, most of cognitive psychology is neutral and affectless, and does not easily admit to the study of subliteral or metaphorical language or motivational dynamics. One such exception within the field, however, is Neisser (1967), who in his classic work recommends a more real-world model of cognition, and who stands just about alone as a major cognitive theorist in urging that cognitive psychology seriously include phenomena similar to that which is presented here, if cognitive psychology is to come to grips with the essential properties of cognition—namely, affect and dream-type processes.⁶ In addition to Neisser's work, there are scattered exceptions to the non-affective approach as indicated by Antrobus (1970) and by occasional debates (Lazarus, 1982; Zajonc, 1980) concerning the relation of affect to cognition.

As with dream processes, if the affective, cognitive, and linguistic findings presented here are fundamental to the field of cognitive psychology and to linguistics, then a great deal about the structures of mind will become evident only when those processes are seriously and appropriately researched. Thus, another well-known psychologist, Slobin (1974), in speaking of trends toward the integration of cognitive psychology, psycholinguistics, and sociolinguistics, suggests that future integrative findings must be phrased "*in terms of universal mental characteristics*" (p. 136, italics added). It is to these mental characteristics that the next section addresses itself.

Empirical Structures

Subliteral, non-conscious, affective, symbolic, or analogic thought functions in a concrete mode. Nevertheless, this mode is capable of expressing complex abstract relationships. As will become evident, the concrete mode of

⁵For two thorough and perceptive reviews on the role of metaphor in psychology and in science in general, the reader is referred to the excellent reviews by Billow (1977) and Hoffman (1980). The Hoffman review article is an encyclopedic critique and therefore required reading for any researcher interested in metaphorical reasoning.

⁶Neisser (1967) maintains that perception is a "constructive" process. More importantly, he holds that dreams are like waking perceptions and, in fact, cognitive events, and what is true in dream perception is probably true of waking perception. Neisser, one of the prominent researchers and theorists in contemporary cognitive psychology, considers Freud a major cognitive theorist. Thus is Neisser's view set apart from the rest of cognitive psychology.

thought "thinks" by moving things about in imaginary space, and each maneuver creates a logical operation. These vehicles of thought may be images, words, or numbers (Haskell, in press).

The important point for our purposes here, however, is that "things" that are selected-in, the *contents*, are of little consequence. Rather, it is how such "thought-things" are used: the relations, operations, and transformations performed on the contents. The structure of thought, or "mind," if you will, is constituted by these functions. The first structure to be illustrated here is reversal structure.

Reversal Structure

It will be recalled that subliterate productions are selected-in to discourse for purposes of expressing non-conscious cognitions. Some of the abstract relations to be expressed, however, do not seem capable of expression in semantic form, similar to some dream processes. Freud (1961), for example, pointed out that for the most part, the dream process cannot semantically express a "no," or other relations such as "as-if." In dreams "no" is expressed formally or structurally by reversing the usual order of things. That "no" is expressed structurally and not semantically is analogous to certain operations in the waking discourse process.

Frequently names and initials are selected-in to a piece of ostensibly literal verbal discourse as subliterate references (Haskell, 1982). For example, in one protocol the novelist Harold Robbins was used, as was a bar called the Hofbrau, a restaurant known as Benihana, and the topic of Rh negative blood. These subliterate references all present the initials of the person in the discussion about whom the discussants have an affective concern. The initials being referenced are: R.H. Sometimes the initials are reversed, as with Harold Robbins; and sometimes they are not, as with Rh negative blood. The reversals, however, are not by accident, or random; they are orderly and systemic: The function of reversal is to assert a negative or negation. It is frequently the case that analogic thought cannot linguistically or abstractly express a negative; instead it must *perform* the negative concretely. In this case, the negative is performed by the concrete operation of reversing the initials.

Although "primitive," this mode of thought is not as illogical as it first appears. It is no accident that only some of the initials are reversed. A careful analysis of the protocol shows that invariably when reversal is not used, the names and initials are expressed in a negative *context* (which, incidentally, is part of the validation methodology). Benihana (where the "B" was substituted for the "R," just as the first name "Robert" is usually exchanged for the shorter form, "Bob") was mentioned in the context of an oriental chef who chopped food with a long knife (aggressively) right at the dining table. In the "Rh negative" blood statement, no reversal was required as it "legitimately"

contained the negative within it. Such logical operations demonstrate an ordered and consistent structure. Reversal structure is related to the next structure of inversion.

Inversion Structure

Inversions change something into an opposite, as in changing the signs on an algebraic equation from a "+" to a "-". In research by Haskell (in press), using a group protocol, the ratio of 9:1 was selected-in. It was asserted that there were 9 hyperactive males for every 1 hyperactive female in the population. The 9:1 ratio was the reverse ratio of the actual group composition: the discussants numbered 9 females and 1 male (excluding the researcher). In response to 9 males to 1 female, the researcher noted to the discussants that this ratio was the same ratio as the group. Then, a male discussant selected-in a story about the place where he worked, where "this joker turned the ladders *upside-down* from the ceiling." Then he added that once "*the signs on the restrooms were switched.*" Changing the signs on the restroom is equivalent to changing the signs in an algebraic equation from "+" to "-". The upside-down ladders, and the switched signs were subliterate inversion operations, signifying that the researcher had the ratio the opposite of what it in fact was. That is, the ratio as the researcher had stated it, was not the same as the group, but the reverse in terms of the male-female ratio. Inversion operations, then, express opposition or disagreement, though unlike reversal, they do not express negation or negativity. Levi-Strauss (1966) maintains that structures of mind are algebraic and Piaget (1970b) finds cognitive structure to be logicomathematical. In this regard, it is interesting to note that one of the properties of the algebraic family is that reversibility takes the form of inversion or negation. From a cognitive perspective, a theory explaining the type of data presented here implies a theory of memory-information storage, organization and retrieval.

Permutation Structure

To change, alter or recombine elements is to permute them. Thus, 6, 4, and 1, can permute into 614, 461, 164, etc. Statements or stories in pieces of discourse are also permuted (Haskell, in press). The above two examples related by the one male member are not simple repetitions, or information redundancy; they are the consequence of a permutation function. Subliterate permutations are generated in order to differentially express a *single* event. The switching of the signs on the restroom doors, and the upside-down ladder assert different notions. "Switching" the signs on the restrooms was a double reference. In addition to informing the researcher that he had switched the "signs" on the ratio, it was also an inversion reference to the fact that the 9:1

ratio selected-in by the original person was incorrect. As he later overtly stated, the ratio of hyperactive males to females was 5:1.

The reference to the upside-down ladder was directed toward the researcher. Thus, by generating two subliteral references, that is, permuting the single event of noticing a mistake in the ratio, the discourse served to differentiate the two mistakes.

Permutation is a cognitive operation that enables, in a concrete manner, various aspects of an event or issue to be differentiated, while maintaining the basic form whose function it is to concretely demonstrate that the "different" references belong to the same issue: i.e., that the variations are transformations belonging to the same group (set). In short, all variations of a set are different ways of expressing a singular affective complex, which can also be seen to be systematically related within a spatial structure.

Spatial Structure

Analogic, subliteral, "primitive," or symbolic references reveal a spatial or directional dimension. Concepts referenced in such discourse are consistently grouped or ordered as being either "up" or "down." The basic mechanism here is by association (Haskell, 1982). Subliteral references to authority are invariably "up," whereas references to subordinates are "down." Associated with the up/down dimension is a set of corollary, or subset spatial dimensions of "in back of" and "in front of." I have found that "up" goes with "in front of," and similarly, "down" goes with "in back of." In one protocol where the males in the discourse were the leaders and the authority figures (and older), references in the literal discourse were of the type "all the men were up front," and a "group of people were (said to be) down back." (The "group" being the non-leaders.) Older was always "up" and younger "down." Furthermore, the pronoun "we," when spoken by subordinate members of the discourse, was always associated with "down." In like manner, the dimensions circle and square were also associated consistently (circle = down; square = up).

Somehow these integral structures are vectorially tracked throughout and consistently tagged. The analysis of such structure provides a powerful internal validation process for other types of subliteral references, on a content level. Such structures are a kind of grid system within which to locate the meaning of discourse, a kind of psychological longitudinal and latitudinal reference system. Affective structures are also reflected in the very syntax of a sentence.

Syntactical Structure

The field of linguistics is mute on the problem of why a particular syntax is

used in a given string of words. Pragmatically there are infinite numbers of ways in which to order a given sentence. Analogic thought often creates the syntactical form of a sentence so that it corresponds to or is isomorphic to its referent (Haskell, in press).

In one protocol, discourse concerned an absent older woman who had excellent diction. It was said mockingly of her that she talks like "Mr. This, Mr. That . . . me, Mark and Tom." The essential observation here is that this syntax is isomorphic to a triadic leadership structure of which the older woman was a member, that consisted of the older woman and two males. As will become clearer in the section on matrix structure, the "Mr. This, Mr. That . . ." structurally represents the two males. The ". . . me, Mark and Tom" equates to the complete triadic structure. As often occurs, through a type of identity-relation, the "me" equates to the older female, since it was a female who generated the sentence; then, "Mark and Tom" again equates to the two males. This structure is repeated in the arithmetical structure below.

Mathematical Structure

If mathematics is, at its base, a set of operations derived from transformations dealing with quantity, forms and their attributes utilizing numbers and symbols, then mathematical structure is to be found in the construction of subliteral or analogic processes.⁷ The protocol where discussants were concerned about the triadic leadership structure reveals that numbers selected-in to the discourse, as in the syntactical structure, are subliteral references to the triad and its subset. Constant and repeated references to twos and threes are selected-in. There were references to local singing groups called the "Three Lucky Spots," and "The Third Stream." Other references to threes included "three drunk seniors" who were on a class trip, and a "\$3,000 fee." These were subliteral references to the triadic leadership structure of the discussion. Subliteral references to twos included a "pilot and co-pilot," and a "\$2,000 fee," "two phone calls," and "two newspapers." These were references to the subset of the triadic structure, i.e., the researcher (pilot) and the younger male (co-pilot) (Haskell, 1983).

Structurally the more significant numbers are isomorphic to the syntactical structure in the previous section where the triadic leadership structure and its subset was referenced in "Mr. This, Mr. That . . . and me, Mark and Tom." The pattern here is "two" linked with "three" (. . . .). This pattern was referenced by a description of "three warehouses, that are two stories high."

⁷As far as I know, the only place where numbers can be seen to operate in a cognitive manner similar to the above is in Freud's *Interpretation of Dreams*. There are, of course, many references in the literature to "occult numerologies" where numbers are thought to have mystical significance. The "psychological" use of numbers is also used, though quite differently from here, in primitive myths (see Cassirer, 1955).

There was also the repeated phase "like two . . . three weeks later."⁸

The same pattern was to be found in another numerical reference, too methodologically lengthy to fully explicate, where the reference to \$2,000 was misheard as \$20,000. In terms of a pattern, again there is the $2 + 3(00,000)$. In addition, the "2" (of the 20,000) is a reference to the two males, the first "0" indicates a different category, which represents the female in the triad; hence $2 + 0 + 3$. Through dream-like mechanisms of condensation and fusion of categories, the last three "0s" again equate to the full triad as well as other females. Other more complex arithmetical calculations are also performed.

Opposition Structure

A constant structure that runs throughout the discourse is opposition. It is perhaps more obvious than some of the other structures. Moreover, its motivational or affective base is also more obvious. As a response to the affect basis regarding dominant versus non-dominant members of the discourse, references to the "giants vs. dwarfs," "public TV vs. network TV," "parent vs. child," "charter flights vs. commercial airlines," "juniors vs. seniors," were generated (Haskell, in press).

Oppositions reflect the collective situation, as well as individual dynamics. An opposition reflecting the difference between two males, was reflected in a piece of discourse about the TV show Richman/Poorman.

Each pair of opposites within a given piece of discourse is not repetition, but rather is a permutation reflecting a different aspect of the underlying affective schema. For example, giant vs. dwarf reflects inferiority, whereas junior vs. senior reflects underlying concerns with age. Frequently oppositions are set up with their resolution following in a piece of subliteral discourse about the opposition. All of the above empirical structures seem to be ordered in a matrix or lattice structure.

Matrix Structure

The type of data presented seems to be generated from a matrix or lattice structure, with each cell within each layer of the lattice structure containing a different aspect of the discourse structure. The multiple permutations in discourse form a multi-leveled lattice or matrix structure. For purposes of this paper, the matrix constitutes a five-tiered series. Each matrix is composed of cells, the exact number of cells depends on the complexity of the protocol being analyzed. From a base or literal matrix, a series of matrices are generated.

⁸It can be incidentally noted here for the purposes of validation that the methodological procedures performed on this data demonstrated invariably that spatially the numbers two and three were associated with the "up" dimension, while other numbers were associated with "down."

Each matrix and its cells are analogically equivalent or isomorphic to each other. An ideal matrix would be: $M_0, M_1, M_2 \dots M_n$ with transformational rules connecting them (Haskell, 1982).

Relative to the data presented in the above section, Figure 1 is a composite matrix. It shows that Matrix M_0 is the base or literal matrix. It includes the affective context and concerns infused in the discourse, and the structure of leadership in the discourse situation. The top cells are permutations of references to the triad. The bottom cells are references to the diadic subset of the triad.

The matrix or lattice structure series can be collapsed into a single structure. In fact, as linguistically or cognitively expressed, many of the subliteral references and especially their relations are integral and fused together. Their associative semantic and syntactic linkages form an integral network. It is a "constructivistic" cognitive matrix that seems to reflect a harmonic structure.

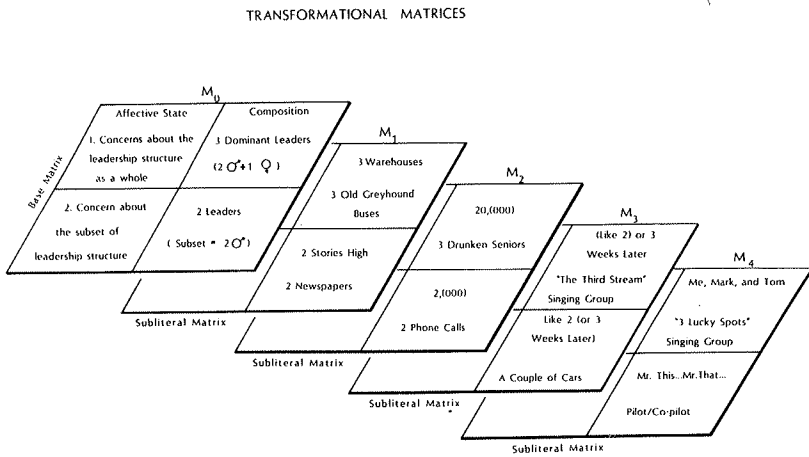


Figure 1: Partial Composite Matrix Series

Harmonic Structure

Researchers such as Chomsky (1968), Piaget (1970b), Levi-Strauss (1966), and others, believe that fundamental orders and structures of mind exist which are wired-in to the neural circuitry of the brain, and that the structure of the neural circuitry is logico-mathematic. Piaget, in addition to his own work, cites the now classic neuro-physiological research of McCulloch and Pitts (1943, 1947) indicating that the nervous system has the structure of a

mathematical function known as a lattice, a multi-level (stacked) transformational matrix, similar in a fundamental way to the matrix structure demonstrated above, which if presented "dynamically" would take on the structure of a spiral, the shape of Piaget's (1970b) epigenetic model of cognitive development.

Further, whatever scientific shortcomings Levi-Strauss' anthropological analysis of myth structure has, he raises some provocative questions and hypotheses about the structure of the brain. In analyzing myths, he finds what he calls transposition and harmonic structures which he compares to musical structure.⁹ Indeed, why and how we can recognize the same piece of music though played in a different octave (a kind of harmonic) or in a different key (transposition) remains to be explained.

In addition to the findings reported by McCulloch and Pitts (1943), there are other experimental data indicating neuronal functioning in a harmonic manner. McCleary (1965) cites the results of a decortication experiment where a cat is conditioned to respond to an auditory tone. Subsequently, the auditory cortex of the cat is removed. The result, as one might expect, is that the cat no longer responds to the original tone. The cat does, however, respond to an octave of that tone.

In two separate studies by Thompson (1965) and by Shepard (1965) on neuronal stimulus generalization and behavioral correlates using tonal frequencies with controls to eliminate overtones, they both found that the cortex has more than one "best frequency," and that these frequencies were octave multiples. Along a tonal gradient, a response is less if the frequency stimulus is merely close to the original than if it is an octave apart. In other words, though quantitatively closer, the response is greater when the frequency stimulus is qualitatively closer, i.e., an octave or harmonic. It was found that responses were elicited to five levels of octave generalizations. Very similar results were obtained to a color spectrum, as well as to tonal frequencies.

These experiments may also be interpreted as evidence for a neuronal substrate for analogical reasoning. A number of years ago, I published two articles (Haskell, 1968-69) on analogical reasoning where I suggested that one of the dimensions of analogical reasoning was what I termed analogic progression, that is, that certain multiple and progressive analogical relationships were harmonic (read: static form = octave) in structure. For instance: 1 : 2 :: 2 :

⁹According to Levi-Strauss, myths are created to mediate perceived cultural contradiction. Though I have not yet analyzed systematically subliterate productions in these terms, it does appear that this is sometimes the case. Subliterate productions and myths are similar psychologically (see Haskell, in press), just as the similarity between myths and dreams has often been pointed out. There are many different operations as well. Whatever the similarities and differences turn out to be, underlying them seems to be what I have elsewhere referred to as analogic thought (Haskell, 1978, 1982).

4 :: 4 : 8 :: 8 : 16 etc.¹⁰

Each plane or level of the matrix series shown in Figure 1 can be seen as an octave, or all together as a multi-dimensional lattice with levels M_1 , M_2 , M_3 , and M_4 being harmonics of a fundamental frequency; the fundamental or best frequency being the base matrix M_0 , or affective schema which transformationally generates the harmonic levels. Beginning with the base affective matrix, there is generated syntactic, arithmetic, semantic, and phonetic (not discussed here) transformations of the fundamental "frequency."

Methodological and Theoretical Considerations

One of the most significant concerns of the behavioral and social sciences, according to Piaget (1962), is the difficulty in ". . . trying to characterize affective life in relation to cognitive functions [insofar as these relate to structure] and especially of defining their interrelations in the actual functioning of behavior" (p. 39, italics added). The findings here suggest both a theoretical approach and a method of linking and tracing that elusive and otherwise scientifically difficult concept, affect, to cognitive and perhaps to logico-mathematical, structural laws of thought.¹¹

Methodological Considerations

In terms of methodology, where is the "cognitive psychologist" to look for laws of thought; in what kind of data and by what methods, and on what level of consciousness? Conventionally, and historically, psychologists and linguists have tended to investigate rational data for the laws of thought, and to ignore "irrational" modes such as dreams. It follows from such a Cartesian assumption that to understand dreams, the findings of information processing, computer-models of cognition be applied to such irrational phenomena.

¹⁰Although these articles formed the basis of my current research, they are exploratory and conceptual rather than empirical/methodological. Written and published during my undergraduate days when I was attempting to link analogical reasoning to such diverse concepts as transposition, stimulus generalization, isomorphism, metaphor, the analogic structure of psychoanalysis, and the transfer of learning, they tend to be somewhat wide ranging. Nevertheless, much of what is contained in those early papers relate directly to this paper, and forms the kernel of a much later methodological work (Haskell, R.E., *The Structure of Talk*; manuscript near completion).

¹¹Piaget (1970) once presented his views on the cognitive development of children to a conference on "Mental Structures and Mathematical Structures," where he met the mathematician Dieudonne who was representing the Bourbaki group. Dieudonne said that he totally mistrusted anything that had to do with psychology. After Piaget gave his talk, both he and Dieudonne were astonished at the similarity between the three structures of children's operational thinking and certain fundamental Bourbaki mathematical structures. (Dieudonne said that it was the first time he had taken psychology seriously, and that unfortunately it would probably be his last.)

The Cartesian model of mind is one of clear and distinct ideas where body and mind, and therefore affect, are separate entities. It is essentially a digital model of on-off processes. Subliteral functions are analogic, integral, and affectively generated. The findings here, therefore, suggest the reverse of a computer modeling or, at the least, creating a parallel approach. Attempts have been made to incorporate affective data into computer models, but without much yield. Abelson (1963), for example, has proposed a model for what he terms "hot cognition," but the type of affect in verbal statements to which Abelson refers as "hot cognition" is in fact rather tepid compared to the type of affect considered here.

I must concur with Piaget (1962) that "unconscious symbolic thought follows the same laws as thought in general . . ." (p. 212). In addition to investigating formalized linguistic type productions and highly rational logic, the kind of data to be investigated should include the type presented here, as well as those so carefully studied in small children by Piaget, those studied in dream processes by Freud, and those studied in the construction of myths by Levi-Strauss, but with appropriately developed methodologies.

The kind of approach suggested by the findings presented here would indicate the investigation of anomalous and affective data like metaphor, schizophrenic utterances, dreams, myths, and poetry, which are just the kind of data behavioral researchers have preferred not to consider. These anomalous and relatively infrequently occurring data, however, have fundamental, theoretical, and pragmatic import well beyond their frequency of occurrence. Werner and Kaplan (1963) make this point clear in pointing out that many theoretically significant phenomena in psychology often occur only rarely and sometimes only under special conditions. Optical illusions, for example, have proved important for explaining normal perceptual processes. Many developmental speech "errors" of children have provided insight into the process of normal language acquisition (p. 264). Indeed, the approach would suggest a psychologic in the sense of an affective "symbolic" logic generating a *qualitative* methodology and theoretical framework which has the advantage of remaining close but not identical to phenomenal perception and understanding.

But this is not to say that traditional quantitative/experimental methods would necessarily be superceded, just as Newtonian mechanics was not eliminated by quantum mechanics. Each method generates findings peculiar or "artificial" to the structure of that method, just as physical experiments on the nature of light performed with one set of procedures finds light to be (read: "act like") a particle, and when performed under another set of procedures finds light to be a wave. Each set of findings has its own uses.

Whatever methodologies are developed, they will have to deal with "speech" events as opposed to "written" language. The methodology from which the present findings were derived was based on the analysis of

"speech." The distinction between written and oral language has an ancient and venerable past (see Baldwin, 1959) whose magnitude of importance is only surpassed by the frequency with which linguistics and behavioral science have ignored the distinction. Speech transcription or practice is not to be approached as if it were a written document. Pauses, sound relations, and other means function as punctuation that can change the meaning of a given sentence. The oral or speech event is psychologically much closer to its affective and cognitive origins than is the "written" mode.

Theory

Theoretically, there is no a priori reason why the human brain, or mind, should be any less structured than the rest of the bodily functions, nor any less ordered than the phenomena of physics. Indeed, as in physics, why should there not be "quarks" of the mind, fundamental structures from which all others are generated? Should "cognitive quarks" exist, one could theoretically trace and predict the effects of these basic structures systemically throughout cognitive and behavioral repertoires.

Whether the empirical structures presented here are in fact "cognitive quarks" or simply derived structures is a conclusion that cannot be made on the basis of current data. In order to draw such a conclusion, more research into anomalous data of the type presented, i.e., dream processes or sleep mentations, primitive myth analysis, puns, slips of the tongue, schizophrenic utterances, along with a psychodynamic and psycholinguistic analysis of poetic processes, need to be accumulated. Psychologists will have to begin taking this kind of data seriously.

Ideally a general theory of such anomalous data will simultaneously explain both the rational/logical/literal and the affective/poetic aspects of not only these anomalous processes but of what is considered normal cognitive processes, just as an adequate theory of social behavior explains not only normal but deviant behavior. In the absence of sufficient data, however, it can be speculated that the findings presented are related, and that they are fundamentally involved in the construction of normal cognitive processes. In addition, I would expect them to be developmentally related, perhaps with dream processes the most "primitive," with myth construction near the "rational" end of a continuum but each level contained transformationally in some way in the next developmental stage, a kind of extended Piagetian epigenetic model of cognitive development.

It is clear that affect plays an important role in the type of transformations illustrated here; that "hot cognitions" in some way shape the more rational "cold cognitions." Some researchers have suggested an "inner sensory form" (Brown, 1977; Cassirer, 1955; Mucchielli, 1970; Vico, 1948) that transforms the more cold cognitions and language production. Piaget (1973) suggests a

"cognitive and affective unconscious." Others have begun to reinstitute research into phonetic symbolism (French, 1977) and to trace speech errors (Fromkin, 1973; Reich and Dell, 1977). All of these areas may well transform our current conceptions of human cognition.

As research accumulates, one would expect a paradigm shift in cognitive psychology; a shift away from—or at least a fundamental change in—the current information processing models of cognition; a change that will profoundly alter our conceptions of mind. Further, such anomalous data must be related to brain research. One obvious area is that of brain lateralization (Gazzaniga, 1967). The metaphoric and symbolic aspects of the type of data presented would suggest a right hemispheric connection. I have already alluded to other brain research (see section on Harmonic Structure) that suggests a multi-dimensional neuronal lattice structure.

It might be asked how it is possible that both affective and "rational" information is stored, compressed, cross-correlated and transformed from within a multi-dimensional neuronal lattice network into a single symbolic structure. A simple association theory is not adequate. One possible explanation lies in Pribram's (1971) holographic theory of the brain. It is in the nature of a holographic image that an entire three-dimensional picture can be reproduced from only a part of the original picture. The same seems to be the case with dream and myth analysis: a single part contains the whole. Based in part on the mathematics of Fourier transforms, the holographic mechanism renders *instantaneous analogic cross-correlations of invariants and transformations* of massive amounts of stored information from multiple levels of processing.

The hologram may be an appropriate explanation of the kind of data presented here. To use only a portion of the above data, what storage-retrieval mechanisms could explain the compression and subsequent generation of the invariant subliteral productions of "three lucky spots," "three warehouses," "three old greyhound buses," "three weeks," "three drunken seniors," "\$3,000," and in addition transform this affective linguistic triadic structure into the very syntax of a sentence such as ". . . me, Mark and Tom"? Like the "bits" of information on a holographic plate, where a given single piece of information is stored everywhere on the plate, so a single given piece of affect appears to be stored everywhere throughout the discourse. As in the compression of multiple meanings in dream symbolism, the type of data presented here, in effect, has no space-time dimension, just as the holographic plate pattern has no space-time dimension. Presumably the compression of space-time is made possible by instantaneous cross-correlative invariant transforms carried out upon both content and structure (if these two terms have any meaning in that sphere). Finally, it would seem that by further research into the structures illustrated here that the linguistic, structural, and semantic findings may well feed back into the construction of a cognitive theory of memory storage and retrieval perhaps of a holographic type.

Conclusion

This paper has outlined, by way of empirical data and findings based on a specifically developed methodology, what can be considered structures of mind. Structures are generated by imaginal "action," by treating abstract relations as-if they were concrete objects, by reversing or turning up-side down representative objects, by including objects within the syntactic form of sentences, and by oppositions. Thus, structures are the consequences of operations and transformations performed on content material. While content is important symbolically, it is nearly irrelevant in terms of structures. Any content can be used. The content is used metaphorically on a subliteral level. Thus, while a given verbal production is considered literal by the subject generating it, the production is in fact symbolic. These findings call into question the conventional distinction between literal and figurative language. Whether a piece of language is symbolic or literal is a matter of how it is "read." One must keep in mind that the study of linguistics was originally heavily psychological (Blumenthal, 1975), but with the advent of structural linguistics, psychology was considered irrelevant. The findings presented in this paper would suggest returning the "psycho-" to the study of linguistics. In so doing, more about the structures of mind will be discovered.

Finally, the approach and findings outlined here open up, once again, the relationship between the "two cultures," the sciences and the humanities. The basic problem of literal vs. figurative language that has historically divided science and poetry acquires not only a different perspective linking the two, but a method of analyzing symbolic structures and their articulation. Thus, as a consequence, the relationship becomes an interdisciplinary venture. Psychology can exist along-side the study of poetics; poetics along-side mathematics;¹² and affective schemata along-side logic. The more that is found out about poetics, the more that will be found out about logic and the intricate structure of mind.

¹²For an interesting explication of the relationship between poetry and mathematics, see the classic work of Buchanan (1962).

References

- Abelson, R.P. (1963). Computer simulation of 'hot cognition'. In S. Tomkins and S. Messick (Eds.), *Computer simulation of personality* (pp. 277-298). New York: Wiley and Son.
- Anderson, C.C. (1964). The psychology of metaphor. *Journal of Genetic Psychology*, 195, 53-73.
- Antrobus, J. (Ed.). (1970). *Cognition and affect*. Boston: Little-Brown.
- Asch, S. (1958). The metaphor: A psychological inquiry. In R. Taqiuri and L. Petrullo (Eds.), *Person, perception and interpersonal behavior* (pp. 86-94). Stanford, California: Stanford University Press.
- Baldwin, C.S. (1959). *Ancient rhetoric and poetic*. Gloucester, Massachusetts: Peter Smith Publisher.
- Bales, R.F. (1970). *Personality and interpersonal behavior*. New York: Rinehart and Winston.

- Billow, R.M. (1977). Metaphor: A review of the psychological literature. *Psychological Bulletin*, 84, 81-92.
- Bion, W.R. (1959). *Experiences in groups*. New York: Basic Books.
- Blumenthal, A. (1975). Psycholinguistics: Some historical issues. In K. Riegel and G. Rosenwald (Eds.), *Structure and transformation* (pp. 135-152). New York: Wiley and Sons.
- Brown, R. (1977). *A poetic for sociology: Toward a logic of discovery for the human sciences*. London: Cambridge University Press.
- Buchanan, S. (1962). *Poetry and mathematics*. New York: John Day Co.
- Cassirer, E. (1955). *The philosophy of symbolic forms: Vol. 2. Mythical thought*. New Haven: Yale University Press.
- Chomsky, N. (1957). *Syntactic structures*. The Hague: Mouton and Co.
- Chomsky, N. (1968). *Language and mind*. New York: Harcourt, Brace and World.
- Cicourel, A. (1973). *Cognitive sociology*. Baltimore: Penguin Books.
- Di Pietro, R. (1978). The role of metaphor in linguistics. In M.A. Jazayery, E. Palome, and W. Winter (Eds.), *Linguistics and literature: Studies in honor of A.A. Hill. General and theoretical linguistics* (Vol. 1, pp. 99-101). Bloomington: Peter de Ridder Pub.
- Farrell, M.P. (1979). Collective projection and group structure: The relationship between deviance and projection in groups. *Small Group Behavior*, 10, 81-100.
- Fodor, J.A. (1974). *The psychology of language: An introduction to psycholinguistics and generative grammar*. New York: McGraw-Hill.
- Foulkes, S.H., and Anthony, E.J. (1957). *Group psychotherapy*. Baltimore: Penguin Books.
- French, L.P. (1977). Toward an explanation of phonetic symbolism. *Words: Journal of the International Linguistic Association*, 28(3), 305-322.
- Freud, S. (1960). *The psychopathology of everyday life* (J. Strachey, Trans.). New York: W.W. Norton and Co., Inc.
- Freud, S. (1961). *The interpretation of dreams*. New York: Science Editions, Inc.
- Fromkin, V.A. (1973). *Speech errors as linguistic evidence*. The Hague: Mouton and Co.
- Gardner, H. (1972). *The quest for mind: Piaget, Levi-Strauss and the structuralist movement*. New York: Vintage Books.
- Gazzaniga, M.S. (1967). The split brain in man. *Scientific American*, 217, 24-29.
- Giglioli P.P. (Ed.). (1973). *Language and social context*. Baltimore: Penguin Books.
- Green, J. (1972). *Psycholinguistics*. London: Penguin Books.
- Haskell, R.E. (1968). Anatomy of analogy: A new look. *Journal of Humanistic Psychology*, 8, 161-169.
- Haskell, R.E. (1968-69). The analogic and psychoanalytic theory. *The Psychoanalytic Review*, 55, 662-680.
- Haskell, R.E. (1978). An analogic model of small group behavior. *International Journal of Group Psychotherapy*, 28(1), 27-54.
- Haskell, R.E. (1982). The matrix of group talk: An empirical method of analysis and validation. *Small Group Behavior*, 13, 165-191.
- Haskell, R.E. (1983). Cognitive structure and transformation: An empirical model of the psycholinguistic function of numbers in discourse. *Small Group Behavior*, 14, 419-443.
- Haskell, R.E. (in press). Thought-things: Levi-Strauss and the modern mind. *Semiotica*.
- Hoffman, R.R. (1980). Metaphor in science. In R. Honeck and R. Hoffman, *Cognition and figurative language* (pp. 393-423). Hillsdale, New Jersey: Erlbaum Associates, Pub.
- Horwitz, M., and Cartwright, D. (1952). A projective method for the diagnosis of group properties. *Human Relations*, 6, 397-410.
- Lazarus, R. (1982). Thoughts on the relations between emotion and cognition. *American Psychologist*, 37, 1019-1024.
- Levi-Strauss, C. (1963). *Structural anthropology*. New York: Basic Books, Inc.
- Levi-Strauss, C. (1966). *The savage mind*. Chicago: University of Chicago Press.
- Mann R. (1967). *Interpersonal styles and group development*. New York: Wiley and Sons.
- McCleary, R., and Moore, R.Y. (1965). *Subcortical mechanisms of behavior*. New York: Basic Books.
- McCulloch, W.S., and Pitts, W.A. (1943). A logical calculus of the ideas immanent in nervous activity. *Bulletin of Mathematical Biophysics*, 5, 115-133.

- McCulloch, W.S., and Pitts, W.A. (1947). How we know universals. *Bulletin of Mathematical Biophysics*, 9, 127-147.
- Mills, T. (1964). *Group transformation*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Mucchielli, R. (1970). *Introduction to structural psychology*. New York: Equinox Books.
- Nash, H. (1963). The role of metaphor in psychological theory. *Behavioral Science*, 8, 336-345.
- Neisser, U. (1967). *Cognitive psychology*. New York: Appleton-Century-Crofts.
- Piaget, J. (1962). *Play, dreams and imitation in childhood*. New York: W.W. Norton.
- Piaget, J. (1970a). *Structuralism*. New York: Harper Torch Books.
- Piaget, J. (1970b). *Genetic epistemology*. New York: W.W. Norton Co.
- Piaget, J. (1970c). *Main trends in interdisciplinary research*. New York: Harper Torch Books.
- Piaget, J. (1973). The affective unconscious and the cognitive unconscious. *Journal of the American Psychoanalytic Association*, 21, 249-261.
- Pribram, K. (1971). *Languages and the brain: Experimental paradoxes and principles in neuropsychology*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Reich, P., and Dell, G.S. (1977). To err is (no longer necessarily) human. *Interfaces: Linguistics and Psychoanalysis*, 7, 6-10.
- Riegel, K., and Rosenwald, G. (Eds.) (1975). *Structures and transformation*. New York: Wiley and Sons.
- Sapir, E. (1921). *Language: An introduction to the study of speech*. New York: Harcourt, Brace, Jovanovich.
- Shepard, R.N. (1965). Approximation to uniform gradients of generalization by monotone transformation of scale. In D. Mostofsky (Ed.), *Stimulus generalization* (pp. 94-110). Stanford, California: Stanford University Press.
- Slater, P. (1966). *Microcosm: Structural, psychological and religious evolution in groups*. New York: Wiley and Sons.
- Slobin, D. (1974). *Psycholinguistics*. Glenview, Illinois: Scott, Foresman.
- Thompson, R.F. (1965). The neural basis of stimulus generalization. In D. Mostofsky (Ed.), *Stimulus generalization* (pp. 154-178). Stanford, California: Stanford University Press.
- Vico, G. (1948). *The new science* (T.G. Bergin and M.H. Fisch, Trans.). Ithaca: Cornell University Press.
- Wallach, M.A. (1958). On psychological similarity. *Psychological Review*, 65, 103-116.
- Werner, H., and Kaplan, B. (1963). *Symbol formation: An organismic developmental approach to language and the expression of thought*. New York: Wiley and Sons, Inc.
- Whitaker, D.S., and Lieberman, M. (1964). *Psychotherapy through the group process*. New York: Atherton Press.
- Whorf, B.J. (1956). *Language, thought and reality*. J.B. Carroll (Ed.). Cambridge: MIT Press.
- Yalom, I. (1970). *The theory and practice of group psychotherapy*. New York: Basic Books.
- Zajonc, R.B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151-175.