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An Investigation of Semantic Invariance in Human Speech

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AN INVESTIGATION OF SEMANTIC INVARIANCE IN HUMAN SPEECH

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This dissertation submitted by David Burton Tarr in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota is hereby approved by the Faculty Advisory Committee under whom the work has been done.

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This dissertation meets the standards for appearance and conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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ABSTRACT

The present investigation addresses the hypothesis of phonetic symbolism, or phonetic universals, in human speech. As a philosophical question, this theoretical notion can be seen as an offshoot of intellectual idealism; the latter school of thought holds that structural invariance is to be found in human cognition. As a psycholinguistic and epistemological concept, the phonetic symbol is understood to be a structural a priori in sound which correlates with the semantic properties of physiognomic, muscular tension. An extension of this hypothesis is the assumption that phonemes without conventional meaning in a language can approximate semantic equivalence of ordinary words under appropriate experimental conditions. This phenomenon has been documented in the work of several investigators (Kohler 1927; Iritani 1962; Langer and Rosenberg 1966). For example, Langer and Rosenberg (1964) developed a set of normed color phonetic symbols capable of evoking color meanings in widely divergent populations. These color phonetic symbols were adopted for target stimulus items in the present study.

This dissertation attempts to explore the psychodynamic parameter- of phonetic symbol access. Specifically, it makes use of a variety of clinical and cognitive/experimental tools to tap instinctual processes which could conceivably contribute to phonetic symbol access. It was reasoned that the phonetic symbol should represent a semantic unit

embedded deep in the evolutionary history of human language. Consequently, it was thought that persons who are most in touch with the instinctual residues of the distant past (i.e., the unconscious) would also have ready addess to phonetic/semantic a priori.

In order to select subjects with differing propensity for instinctual thought, two widely accepted clinical instruments were employed. The Myers-Briggs Type Indicator was used to identify persons on the extremes of the attribute of intuition; Jungian psychology holds that high intuition is synonymous with access to unconscious and instinctual processes. The Rorschach Inkblot Test has been adapted by Holt (1970) to differentiate the Freudian constructs of primary and secondary process thought; further, Holt's scoring system attempts to distinguish mature, creative primary process from disorganized primary process. The present study predicted a high correlation between easy access to instinctual contents (intuition, adaptive primary process) and skill in decoding phonetic symbols.

Other experimental manipulations included examinations of the influence of cerebral laterality and interpersonal sensitivity on phonetic symbol skill. It was hypothesized that phonetic symbolism would correlate positively with right cerebral hemisphere processing and high interpersonal sensitivity.

With the exception of the hypothesis concerning interpersonal sensitivity, none of the experimental hypotheses was supported. Nonetheless, trend level significance was noted in correlations involving several of the Rorschach indices. An unexpected correlation between female gender and phonetic symbol access was found; this was discussed

in the context of previous findings demonstrating superior female verbal ability.

CHAPTER I

INTRODUCTION

Two radically different approaches to human understanding can be seen as streams issuing from classical Greece and stimulating intellectual expression in Europe and the United States from the seventeenth century until the present time. The first approach is that formulated by Plato, and it maintains that human apprehension of truth can occur independent of sense experience through a process of recollection of innate ideas. A corollary to this assertion is the doctrine which holds that objects encountered in the world are mere reflections of preexisting ideal concepts of these objects. The second approach is that associated with Aristotle, and it contradicts the Platonic notion of transcendent, or innate, ideas. Rather, it holds that existent, immediate forms are no less real than the general concepts which they represent. Consequently, human knowledge is seen as advancing through the exercise of sense perception in the present time. Refinements of knowledge can occur over time as a person learns to make discriminations between objects across sense modalities. Hence, the Platonic approach can be described as ideal, introspective, reductionistic, abstract and mathematical; whereas, Aristotelian method is to be seen as realistic, investigative, taxonomic, concrete and empirical. The former approach presumes a unity among the sciences, and the latter insists on independence of the various sciences (Russell 1945; O'Connor 1964a).

It proves useful conceptually to distinguish between Platonic and Aristotelian theories of knowledge, since much controversy across academic disciplines has resulted from this very basic difference in epistemology. Of particular interest here is the way in which this dichotomy is manifest in the domains of: 1) philosophical theory of knowledge, 2) psychological theory of knowledge, and 3) in linguistic theory. In an effort to illustrate these differences in approach within modern intellectual history, a sampling of authors from these three areas is presented below. No attempt is made to provide an exhaustive treatment of each contributor. Rather, the sketch below is intended to offer an appreciation of the evolution of debate within and across disciplines.

PHILOSOPHICAL THEORY OF KNOWLEDGE

Empiricist Conceptions

Thomas Hobbes (1588-1679), one of the earlier British empiricists, promulgated a materialistic theory of knowledge which maintained that all thought results from human sensing of motion in the external world. He questioned the worth of religious belief, stating that "man can have no thought of anything not subject to sense."

For Hobbes the principal use of language was as a means of classification through the assignment of names. Names were seen as arbitrarily chosen to serve as "marks" for referents in the environment. Hobbes insisted that all speech meet the requirement of performing a classificatory, or naming, function; any speech not meeting this test was relegated to the class of nonsense speech or mere sound. Hobbes justified this stricture by describing the vital role of language in

building abstract reasoning. He used the analogy of geometry, which also starts with units of arbitrarily assigned meaning (i.e., axioms) and which then creates more elaborate theorems and proofs. Hobbes presaged associationist doctrine by thus demonstrating the linkage of simple language to more complex and contingent language and thought (Flew 1964a).

Associationist principles matured in the writings of empiricist John Locke (1632-1704). Locke believed that all human knowledge derived from experience either from direct linkage with the esternal world through the senses or from our own mental life through introspection. In Lockean theory the process of association permits an idea, A, to become a sign for an event or mental content, B. As signs, ideas were thought to represent to the mind whatever the person might be thinking of; ideas were thought capable of carrying a variety of meanings, such as immediate objects, sensory events, images, abstract ideas, etc. In this system, words were seen as second derivatives of ideas and therefore capable of existing only in association with these ideas; whereas, ideas were seen as having existence independent of language. Using a commercial metaphor, Locke maintained that language is meaningful to the extent that it is backed by ideas in the same way that currency is valuable to the extent it is backed by goods.

Locke dismissed the possibility of ideas being innate using both strong and weak sources of evidence. In answer to arguments favoring the innate goodness of man he replied that our living experience strongly contradicts any assertion of natural, untaught virtue. Locke's approach was more conservative in response to those suggesting the growth of thought and idea in human embryo. He essentially invoked Occam's razor

stating that "we have no evidence that a truth is in the mind other than it is understood"; in other words, innate ideas are not subject to introspective observation.

The chief dilemma which confronted Locke was his need to explain how knowledge advances without resorting to nativist conceptions or imputing unrealistic properties to human consciousness. A note of frustration is seen in Locke's attempt to explain how the blank slate of mind is filled; ultimately, he challenged the reader to "examine his own thoughts and report whether all the original ideas are any other than of objects of his senses or of the operations of his mind considered as objects of his reflection." Essentially, in so writing, he posed a two part method of cognition: sensation was the primary and immediate means of receiving external stimuli; reflection was the secondary mental activity involving interpretation and introspection. Complex mental activities such as thinking, doubting, believing, reasoning and willing were understood to be the products of reflection; also, it was through reflection that the simple ideas generated by sensation were associated with one another to form complex and abstract ideas (O'Connor 1964b).

David Hume (1711-1776) developed a two part schematic of cognition similar to that of Locke but which distinguished between two forms of immediate sensory experience. An impression was Hume's concept of a strong, initial sensory experience involving a sensation, passion or emotion as it makes its first "appearance on our soul." An idea was a weak perception derived from an impression and which influenced thinking and reasoning. The fundamental difference between an impression and an idea was simply that of strength. Hume used the evidence

of persons with defective sense (e.g., blind or deaf from birth) to demonstrate that ideas and thoughts are possible only for perceptions seen or felt in the individual's own mind.

In a discussion of instinct Hume made the point that learning from experience is a very primitive capacity. He cited examples of "ignorant and stupid peasants, . . . infants, even brute beasts" being able to learn yet unable to show any insight or predictive control over future events. In this sense, he included man as wholly part of animal nature rather than a being uniquely set apart for its capacity of reason. A notion of evolution is suggested in Hume's concept of custom, which was used to show how repeated experience of an instinctual sort might become consolidated in the ordinary person's mind. However, such automatic inferences or memories of experience were distinguished from reason.

The possibility of reason or abstract thought was understood to occur only through the use of philosophy. Hume believed that philosophy's strength was its inherent skepticism which gives awareness of the imperfections and narrow limits of human understanding. Ordinary men were seen as carried along by natural instinct and capable of only intermittent self awareness. Hume argued that the application of very elementary philosophy teaches one that "the table which we see seems to diminish as we remove further from it, while the real table, which exists independent of us, suffers no alteration." In other words, philosophy shows that mental perceptions cannot be identified with external things (Flew 1964b).

Rationalist Conceptions

The rationalist position of Rene Descartes (1596-1650) gave considerable credit to human capacity to initiate thought and appreciate the limitations of perception. His famous credo, cogito, ergo sum, carried a clear affirmation of belief in the power of human understanding. Implicit in the statement, "I think," is the Cartesian notion of mind as wholly other, intangible and possessing qualities separate from that of body. Mind was seen as being informed by the senses but at the same time totally apart from them. To demonstrate the comprehensive nature of mind versus the inherent limitations of sense, Descartes employed the example of the ball of wax. Whereas each sense individually will lead to error in describing only one dimension of the wax (i.e., its hardness, color, shape, odor, etc.), the mind is able to perceive its many qualities simultaneously and will also know that it is the same wax when it is melted and assumes a new shape. The limitations of the individual senses were thought by Descartes to provide clear evidence that mind and body were coexistent only to the extent that mind might receive mechanical signals from body to assist it in decision making.

For Descartes, mathematics provided the working model for testing the validity of one's deductions about reality. He held that non-empirical scientific advancement occurs when one uses logic to carry out assumptions that are simple and obvious until one arrives at conclusions that are neither simple nor obvious.

Deduction and intuition were seen as working hand-in-hand in the service of achieving understanding. In Descartes' system intuition was not an inspirational event but was rather a basic, well disciplined

method of determining whether an inferential step in an argument was valid. Deduction was seen as a process dependent upon intuition and having the same goal as intuition, namely determination of the truth or falsity of a proposition. Yet deduction was thought to be less direct than intuition, in that it might be accomplished by gaining understanding of propositions which are extensions of a first proposition; in this instance, perfect understanding of the first proposition may not be necessary.

By introducing a mathematically based theory of understanding into philosophical discourse, Descartes hoped to achieve absolute rigor in describing human cognition. Through a technique which he called the Method of Doubt, Descartes amplified the rigor of discourse by requiring himself to discard any assumption he could conceivably disbelieve. Only those assumptions meeting this test were included in a set of fundamental assumptions. It was this exhaustive examination of intellectual propositions and assumptions that gave Descartes the confidence to state "whatever I perceive very clearly and distinctly is true" (Watling 1964).

Gottfried von Leibniz (1646-1716) shared Descartes' confidence that all problems of knowledge are susceptible to mathematical analysis. Leibniz foresaw a time when human conflict would be resolved through the use of mathematical calculation.

In Leibniz's philosophical system, calculation was employed to elucidate the relationships among primary "real beings" which he called monads. The monad was Leibniz's attempt to counter atomistic tendencies in empiricist theories of reality. These empiricist notions typically maintained that all things consisted of elementary particles

in a constant state of flux and that these particles existed in an interdependent relationship. By contrast, a monad was conceived by Leibniz to be a simple substance without parts which resists impact or penetration from other monads; it was seen as existing in immutable form and as supplying its own energy for activity.

The monad was primarily a cognitive entity whose function was perception, thought or consciousness. Consequently, the soul was seen to be the dominant monad which is capable of governing the monad of body through the exercise of will. Monadology also reflected itself in human language, such that the exclusiveness of names was seen as an ideal, "one name, one thing." Moreover, language in Leibniz's system was viewed as the analog for relationships between objects and persons in the real world. He believed that the way that names are put together shows the way that things are put together. Therefore, propositions were thought to portray meaning by picturing facts.

A devout Christian, Leibniz believed that God, in his perfect knowledge, could read from the true names of individuals all that is true of them, past, present and future. This represented the completeness of the monad of the name and its perfect correlation with the true nature of the person named (Saw 1964).

Immanuel Kant (1724-1804) shared in the idealistic climate that inspired Leibniz's monadology. There is a Platonic remnant in Kant's explanation of sensation. Noumena, or things-in-themselves, were seen as general ideal objects which impact on the senses. This was contrasted with the specific instance of a phenomenon which appears to the individual in the experience of a particular object. A phenomenon was understood to contain two components; first, the sensation, which is

primarily a property of the object, and, secondly, one's own particular apparatus which orders the various parts of the sensory experience into a perceptual whole. The individual thus provides active synthesis of what is ultimately perceived and understood.

For Kant the physiological givens which determine what we see and perceive also prepare one to order the world into a set number of a priori categories consisting of the subtypes of quantity, quality, relation and modality. The event of perception typically calls upon the individual to make a whole of the disparate sensory elements impinging on him at that instant and to match this with an a priori form from the relevant categories at his disposal. The transcendental schema was Kant's notion of an a priori template against which to compare the novel sensory experience so that it might be categorized and then assimilated. The sensory contents of nature which were constantly compared against transcendental schemata were divided into units of perception which Kant called appearances.

There were two fundamental a priori forms or intuitions which Kant posited. One of these was the intuition of space, by which was meant the innate outer sense of reality. The other a priori intuition was that of time, which Kant termed our internal sense. Together these intuitions were seen to assist man in determining categories of phenomena through application of innate rules governing the perception of particular stimuli.

To elucidate further his notion of the a priori, Kant discussed the distinctions between empirical and a priori propositions. Empirical propositions were those known only with the help of sense perception. Examples of academic studies reliant primarily on

empirical propositions would include history, geography and the observational sciences. A priori propositions, by contrast, have their basis in a reality that supercedes experience but yet may be made manifest through experience. Kant used the example of the mathematical proposition, 2 + 2 = 4, as a clear immutable a priori reality. Yet the concrete representation of this abstract notion would involve an experimental component (e.g., a young child manipulating building blocks).

The brief sampling of theoretical notions of epistemology presented above points to several consistent differences between empiricist and rationalist approaches to the problem of knowledge. These differences range across the scope of human inquiry; they are present in contrasting understandings of the cosmos and in differing views on highly particular considerations of learning and language. They betoken fundamental discord between the empiricist and rationalist beliefs concerning the nature of man. Skepticism characterizes Hume's attitude toward the average man's effort to go beyond the very immediate sensory information in his environemnt; Mr. Everyman is seen as bound to the limitations of instinct and custom, incapable of appreciating subtlety or perceptual constancies until he becomes something of a philosopher. By contrast, Descartes would argue that all is possible through the exercise of reason in inquiry. In the Cartesian system, well disciplined thought is both a foolproof method of reaching solutions to problems and also a form of evidence for one's own existence.

The role of experience in generating human understanding represents another clear cleavage between the approaches of 17th and 18th century empiricists and rationalists. For Hobbes, Hume and especially

Locke experience and the exercise of sense are the sole means for accumulating knowledge and eventually achieving the capacity for abstract thought. This differs sharply from the thought of Descartes, Leibniz and Kant who all stress the innate capability to impose order and categorize experience into meaningful, abstract propositions.

Those theorists who treat the place of language in their respective systems maintain the empiricist/rationalist dichotomy. Hobbes and Locke discussed language, and particularly naming, as an arbitrary process in which speech sounds take on meaning through repeated pairing with referents in the environment. A diametrically opposite view is seen in the work of Leibniz when he wrote that all language and naming is, per se, meaningful and that the goodness of fit of the name will become apparent as our knowledge of the referent improves. It should be noted parenthetically that these opposing positions on language were essentially identical to those represented in Plato's dialogue, The Cratylus, some twenty centuries before the birth of Locke, Kant or Leibniz. In the dialogue, the protagonist, Hermogenes, rebuts Cratylus' nativist position by saying one name is no less correct than the one it replaces, and therefore we can change the names of things "just as we change the names of our slaves" (Fowler 1926).

PSYCHOLOGICAL THEORY OF KNOWLEDGE

The Associationists

The date frequently given for the founding of psychology as a scientific discipline is 1879. This is the date of the establishment of the first psychology laboratory by Wilhelm Wundt at the University of Leipzig. This was the first laboratory devoted exclusively to

experimental and physiological psychology in the world, and its founder was one of the most prodigious laborers and publishers in the history of academic psychology. While trained originally in medicine, Wundt held professional appointments in philosophy and psychology as well as physiology. His productive scholarship flourished in these three areas simultaneously.

Wundt's systematic psychology was distinctly associationist and atomistic. Although Wundt's laboratory methods were introspective, he attempted to focus on microscopic elements of human sensation and perception by giving his subjects special instructions to limit the scope of their attention and report. The goal of these analytic instructions was to isolate sensations and identify them as minuscule phenomena, which, in turn, might be compounded into more complex sensations through association. For example, Wundt's tridimensional theory of feeling held that a given feeling could be exhaustively described, via compounding, using the dimensions of pleasantness-unpleasantness, strain-relaxation and excitement-calm.

The fundamental subject matter for Wundt's psychology was human experience. By so asserting, Wundt wished to distinguish his psychology from metaphysics. This represented a departure from the work of many of his predecessors in German psychology (e.g., Fechner and Lotze), and it was probably his insistence on this change of emphasis that forged psychology as a separate discipline. Wundt wished to distinguish the subject matter of psychology from that of philosophy (i.e., inner experience) on the one hand and that of physics (i.e., mediated experience) on the other. Consequently, Wundt claimed that psychology's

field of investigation was that of immediate experience using the method of introspection (Boring 1950).

Hermann von Helmholtz was a senior contemporary of Wundt's but preferred to consider himself exclusively a physiologist and physicist interested in problems of sensation and perception. Much of his work centered on measuring and mapping human report of visual and auditory stimulation; he theorized extensively in both of these areas, and his chief works, Handbuch der physiogischen Optik and Tonempfindungen were presentations of his experimental findings and conclusions.

As a philosopher of science and epistemologist, Helmholtz was decidedly empiricist in approach. He did not write a formal exposition of his system, but his writings on method make it clear that he shared Wundt's affinity with the thought of Locke and Mill. He went to considerable pain to dissociate himself from Kantian notions which were dominant in German academia during his early education. He had objections to the nativist assumptions of perceptual a priori and the presumed intuitions of time and space. Essentially, Helmholtz complained that nativist theorists "plunged in" with elaborate and speculative explanations regarding the physiological determinants of perceptual images without benefit of experimental data. Indeed, he felt much of his own work was suggestive of the development of perceptions in experience. Helmholtz also wrote extensive arguments aginst the Kantian assertion that geometric axioms are a priori intuitions. He cited evidence for the experiential basis of the acquisition of geometric reasoning in the general method of teaching the rules of congruence and similarity through physical imposition of one form on another (Boring 1950).

American psychology in its functionalist and behaviorist forms shared Helmholtz's commitment to parsimony in exploration of human perception and behavior. John W. Watson, the founder of American behaviorism, renounced all nativist and introspectionist trappings and insisted on systematic observation of behavior as the only legitimate data for psychological research. All behavior was, in turn, understood as responses to stimuli of the organism; the linkage between a given stimulus and response was adopted from Pavlov's notion of conditioned reflex. He assiduously avoided any suggestion of a theory of human knowledge for fear of falling prey to subjectivism that is not verifiable experimentally. Watson's commitment to externalization of psychic phenomena was so complete that he preferred to regard thought as subvocal speech rather than to give credence to any introspective process. An active polemicist for his extreme associationist position, Watson wished to make psychology a natural science on an equal footing with chemistry and physics. As such, psychology needed no recourse to introspection or consideration of epistemology (Watson 1913).

The Nativists

The Gestalt psychologists were among the most prominent adherents to the nativist/idealist tradition in twentieth century psychology. The three men credited with creating and articulating the main tenets of this approach to the study of perception were Max Wertheimer, Wolfgang Kohler and Kurt Koffka. They collaborated on perceptual research at the University of Frankfort, and they all emigrated to the United States when Hitler came to power.

As an intellectual movement Gestalt psychology was a reaction

against the atomistic theories of Fechner, Wundt and Helmholtz which had come to dominate studies of perception in Germany. Once transplanted on American soil, it combatted the stimulus-response atomism of behaviorism. In contrast to these elemental theories, Gestalt presented itself as a field theory which regarded behavior as occurring within an environmental field composed of various force vectors. This environmental surround can provide a contrasting ground for a figure which may appear and become increasingly differentiated from the ground as its contours and boundaries become articulated. As the figure, or gestalt, appears to the onlooker to show increasing organization and symmetry, it demonstrates the gestalt law of pragnanz, which maintains that a figure will be as regular and stable as prevailing environmental conditions permit. A corollary to this principle is the observed phenomenon of closure, in which an uncompleted drawn figure is perceived to be whole and complete (i.e., "closed"). The hypothesized tension within a person to bring about closure perceptually also operates in the cognitive sphere to motivate the person to finish a task or to achieve a definite opinion about something, etc.

While Gestalt theorists preferred to see themselves as experimenters in perception, it is clear that their assumptions have implications for an epistemology. It is implicit, for example, that the process of creating a figure against a ground occurs within the person as a spontaneous event and is not a product of the piecemeal association of elements. This inner tendency to view reality holistically demonstrates the principle of isomorphism, which maintains that a point for point correspondence exists between the inner concept of a thing and its outer manifestation. In other words, there is a preset

patterning of neural impulses which communicates the notions of roundness, squareness, redness, etc. and applies these concepts to objects in the environment which have these attributes (Koffka 1935).

Wolfgang Kohler applied the principles of Gestalt psychology to the study of language in an effort to determine the perceptual potency of certain speech sounds. He argued that the metaphoric and poetic use of language came into being because of the cross-modal, or isomorphic, equivalence of various phenomena. This isomorphism leads one to describe grief as "bitter" or an opaque visual image as "fuzzy." Kohler went further with his studies of verbal isomorphism by exploring the propensity of nonmeaningful speech sounds to engender spontaneous association matches for individuals. Specifically, he reported that a large majority of subjects preferred to see an angular, pointed figure as a takete and a rounded figure as a maluma. In this instance, Kohler seemed to equate a type of synesthesia with the cross-modality he discussed in terms of poetic metaphor. In both instances, the argument for isomorphic representation is stressed (Kohler 1927). Cross-cultural confirmation of Kohler's results was provided in a replication of his study using monolingual Tanganyikans as subjects (Davis 1961).

Researchers in ethology, animal psychology and developmental psychology have reported numerous evidences of complex, nonatomistic behavior patterns and perceptual tendencies. The work of Konrad Lorenz on imprinting highlighted an inborn need for ducklings to attach to a caregiver; this need was discovered to be sufficiently potent to promote attachments to humans (Gibson 1969). The presence of clear preferences for certain response patterns in the acquisition of avoidance learning suggested to Bolles that animals possess species-specific

defense reactions which will tend to be more easily learned and less easily extinguished than behaviors incompatible with such reactions (Rachlin 1976). T. G. R. Bower investigated perceptual constancy among human infants ranging in age from 70 to 85 days. He discovered that the infants were able to discriminate between a 12-inch cube placed at a distance of three feet and a 36-inch cube placed at a distance of nine feet. Since the retinal displacement of each of these cases would be equivalent, Bower concluded that the infants demonstrated perceptual constancy well in advance of when it had been assumed to occur (particularly according to behavioral developmental theorists) (Gibson 1969). The research of Fantz on form perception showed that infants aged two to six weeks have distinct preferences for certain geometric shapes as well as a definite tendency to orient to stimuli approximating the human face. These perceptual preferences showed themselves as visual acuity matured sufficiently to permit perceptual registration (Fantz 1958).

The organismic psychology of Heinz Werner represents another theoretical scheme that participates in the idealist/nativist tradition. Werner's psychology was a biologically based understanding of human development and cognitive growth. A succinct summary of his theory is found in his orthogenetic principle, which states that "whenever development occurs it proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation, articulation and hierarchical integration" (Baldwin 1967). Werner applied this principle to the development of individuals and societies, believing that diffuse and global organization within a collective was a clear analog to the young child or even the psychotic person showing develop-

mental impairment. Although enormous differences in the particular are seen among primitive societies, young children and schizophrenics, Werner felt that they share a common globality and lack of differentiation. Furthermore, such lack of differentiation was understood to be organic and maturational rather than the mere lack of opportunity to engage in associative learning.

Capacity to develop normally was believed to require the successful resolution of several critical sub-issues of differentiation: 1) The first of these is syncretic vs. discrete cognition. Syncresis implies a fusion of thought contents into wholes which are inappropriate in the functioning adult. An example might be that of synaesthesia, in which two senses are merged, and the reported sense experience might be of hearing color in sound or smelling a bright odor. Greater discreteness and separability of sense perception is characteristic of a higher level of differentiation and development. 2) Diffuse vs. articulated. Articulation assumes greater specialization and effective coordination among separate parts of an organism toward the achievement of goals. Diffuseness, by contrast, suggests an inability to establish executive control over the whole system and a lack of harmony of function of the separate parts. 3) Rigid vs. flexible and labile vs. stable. These two dichotomies taken together describe closely related aspects of maturing mental function. Well differentiated persons will prefer variety in stimulation and behavioral expression. Immature or pathological rigidity is characterized by perseveration, ritual and inability to innovate or shift set. Stability is an outcome of flexibility, in that novelty does not pose challenges to the well being of the system; it can adapt and evolve (Baldwin 1967).

Werner and Kaplan's work, Symbol Formation (1963) applied the organismic theory to the ontogenetic and phylogenetic development of language. One of the key concepts discussed by these authors was that of physiognomization, the movement and tensions of facial musculature when speech is produced. Theory would hold that the global and undifferentiated speech of the primitive shows the highest correlation between facial and bodily movement and that eventual erosion of this relationship occurs as speech becomes more differentiated and articulate. As this process takes place the semantic function of speech depends less and less on immediate, affective and onomatopoeic properties and shifts to more cognitive and descriptive functions.

Some of Werner's research is suggestive of a noncognitive, affective residue in the highly differentiated speech of twentieth century humans. In an experiment involving tachistoscopic presentation of common nouns, subjects were unable to read the words because the shutter speed was well below reading threshold. However, many people were able to give adjectives and attributes which are commonly associated with the word. For example, one person said of the word, twig, that it gave her the sense of brittleness. Werner described this result as an example of microgenesis, where there is a gradual unfolding of feeling significance of the word prior to actual recognition (Werner and Kaplan 1963).

LINGUISTIC AND PSYCHOLINGUISTIC THEORY

The Associationists

Leonard Bloomfield made a considerable impact on the development of linguistic theory in the United States during the first three

decades of this century. He regarded himself as a taxonomist of human language, and, as such, he sought to observe, categorize and define the various attributes of language. However, in the process of classification Bloomfield revealed an associationist bias through discussion of "stimuli which cause an act of speech and the reactions to it."

Bloomfield distinguished between mentalistic and mechanistic explanations of speech and language, and he expressed the view that the mechanistic (i.e. behavioral) approach is preferable in scientific discourse because of its hard-headed insistence on the external facts without any mention of internal images, ideas, etc. In the 1933 edition of his text on language he stated that his revision of the 1914 work had deleted several passages using application of Wundt's psychology, presumably due to its reliance on introspection. Although he did not credit Watson for having influenced his adoption of a radical mechanistic/materialistic position, his decision to limit linguistic observation to behavioral phenomena is consonant with Watson's position. He wrote that the mechanist interprets mental images and feelings to be "merely popular terms for various bodily movements" which fall into one of three categories: 1) large scale processes which have social importance and are represented in conventional ways (e.g. "I'm hungry"); 2) obscure and variable muscular and glandular activity which vary among people; and 3) soundless movements of the vocal organs, taking the place of speech-movements, but not perceptible to others (Bloomfield 1933).

The French linguist Saussure is generally classed as a structuralist, and, as such, one might expect him to be discussed among nativists or gestalt theorists. Saussure appears to differ from Kohler and other

nativist/structuralists in that he acknowledged structural order solely as the result of years of social interaction and evolution, that is as an associationistic process. Saussure distinguished language from speech, which he regarded as a broad category including the instinctual, physiological capability to utter sound. Language, by contrast, referred to the oral and written symbolic system of a cultural community. Although Saussure believed the use of the human vocal apparatus came into being for its efficiency and ease of use, he did not believe human vocal utterance possesses semantic relevance. This position clearly contrasts with physiognomic theory as presented by Werner.

For Saussure the speech sound or sign is entirely arbitrary. The bond between speech sound and its referent was seen as the result of an associative process stamped in by years of convention within the community. He wrote "the idea of sister is not linked by an inner relationship to the succession of sounds . . . . " In effect, Saussure made the principle of the arbitrariness of the sign the cornerstone of his linguistic system because he felt that the chance of building a thoroughly consistent, rule-governed language would be greatest when little is owed to the distant, instinctual past. The Saussurian ideal would be a situation in which all speech sounds would have an equal chance of representing a given referent. Saussure objected to the use of the word symbol, preferring instead sign, because a symbol is never wholly arbitrary; it carries the rudiment of a natural bond between the sign and its referent (DeGeorge and DeGeorge 1972).

The psychologist B. F. Skinner is included in the discussion of linguists and psycholinguists because of his contribution to the

literature of linguistics, or verbal behavior, as he preferred to call it. Like Saussure, Skinner was reluctant to pursue antecedent, internal ideas or symbols in the course of inquiry on verbal behavior. Skinner made this clear when he juxtaposed traditional formulations with his own notions of verbal behavior. Whereas linguistics had spent its energy in recording and analyzing speech sounds and practices, little had been done to study the causality of verbal behavior in an effort to predict and control it. Skinner stated that other disciplines failed to achieve a causal/functional analysis of verbal behavior due to the insistence on associating utterances with ideas and meanings. Skinner disputed such practices as unscientific because they render the behavior exempt from control or measurement. Skinner objected to the notion that verbal behavior, per se, is meaningful. He believed that meaning is not a property of any behavior as such but rather of the conditions under which the behavior occurs. Psychologically, Skinner regarded verbal behavior as a dependent variable, and he wished to claim that meanings are to be found only in independent variables.

Skinner believed that a new formulation of inquiry into verbal behavior should follow the rules of any other behavioral science. Specifically, he stated that the first responsibility of such a science is that of any infant science, namely observation and description. As one conducts systematic observation of verbal behavior, one learns the unique conditions of its occurrence and also gains an awareness of the variables of which it is a function. Still in the course of observation, the behavioral scientist will note differential outcomes and consequences of various verbal behaviors and will become able to make informal inference as to which types are most effective. The latter

observational step is the precursor to gaining experimental prediction and control (Skinner 1957).

The Nativists

Roman Jakobson was both an acute observer of verbal behavior and a practiced taxonomist in the Bloomfieldian sense. Yet he was assertedly structuralist in his way of viewing language; he agreed with the notion that language could be studied as a kind of algebra. Much of his work appears to be a direct refutation of the Saussurian doctrine of arbitrariness and a strong support for nativist conceptualizations in linguistics. He cited the work of the 19th century philosopher, Charles Sanders Peirce, who divided linguistic signs into three categories: 1) the icon, which bears a close resemblance to the thing signified, 2) the index, which depends on existential (spatial and temporal) co-occurrence with the referent, and 3) the symbol, which acts chiefly by imputed or learned contiguity with the object signified. Jakobson remarked that Saussure's insistence on arbitrariness of signs limits his consideration to the last category, that is, the one which minimizes any inherent bond between the signifier and signified. In effect, Peirce's theory suggests that any given word will participate partially in all three forms of signification but with a predominant manifestation in one. For example, an onomatopoeic word might be mainly iconic yet have some indexing and symbolic qualities as well. Cassirer wrote in the same vein and posited a three-stage temporal evolution of language, in which human speech was seen to undergo a transformation from mimetic reproduction to high level abstraction and symbolization (Cassirer 1953).

For Jakobson, the case for application of structuralist principles in both syntax and semantics was compelling. In terms of word morphology, for example, he noted that Indo-European languages treat adjectives in a similar manner in that the length of the adjective increases as it progresses from the positive to the comparative and superlative degrees (e.g. high--higher--highest, altus--altior--altissimus). Another instance of suggested inherent structure is in the morphology of family affine terms across languages, e.g. father, mother, brother. These consistencies of structure led Jakobson to reject the radical associationist viewpoint of Saussure and to prefer instead explanations that acknowledge the contribution of millenia to the forming of linguistic categories of word morphology and syntax (Jakobson 1965).

Noam Chomsky took the formulations of Jakobson and coordinated them with his own studies in syntax and transformational grammar to generate strong assertions on the innate character of language. Chomsky and his mentor, Zellig Harris, noted and diagrammed structural consistencies in various languages, and they began to theorize over the possibility of structural universals that can be found in the syntax of languages. An exhaustive exploratory study revealed that one could not guarantee that a structural category found in one language could be found in another. Chomsky modified his initial theoretical position to account for this by adopting the mathematical notion of the "empty set." Environmental influences might exert themselves in such a way that some of the available sets or categories in transformational grammar might not be employed. In this sense, Chomsky understood environmental effects providing "boundary conditions" for a language.

Nonetheless, Chomsky believed that activation of initially empty sets--for example, in the learning of a second language--provided confirmation of their universal status. An example of this phenomenon could be cited in the case of the English speaking person learning French and mastering the distinction between polite and familiar forms of address, a concept which dropped out of English as it evolved to its present form.

Another piece of evidence that Chomsky mentioned to buttress his case for the innateness of language structure is the fact of universal expertise in the performance of routine speech; this skill was noted across all levels of educational attainment. Although a certain amount of grammatical variability is correlated with socioeconomic level (e.g. "he don't know" vs. "he doesn't know"), certain errors of word order almost never occur. For example, a sentence like, "is the man who tall is in the room?," would never be used.

Chomsky claimed that the native speaker's predisposition to access proper word order in expressing his thoughts provided evidence for a deep structure of language. Deep structure carries both syntactic and semantic importance, in that it implies the existence of species-specific cognitive abilities which assist the native user in organizing and apprehending verbal input. Surface structure, contrasted with deep structure, is the manifest order and presentation in oral and written language. Chomsky noted that sentences such as, "they ran after lunch," and "they ran after John," possess similar surface structures but very different deep structures; the fact that the vast majority of the population appreciates the difference between these sentences is offered as confirmation of the deep/surface distinction. Another form

of evidence is suggested in the developmental literature where the phenomenon of overregularization is cited in language acquisition. Three-year old children are often heard to apply grammatical rules in instances that are exceptions to these rules (e.g. "my foots are cold."). These errors suggested to Chomsky a "wired-in" capacity to apply a language's rules of invariance in novel situations (Chomsky 1980, 1975).

PHONETIC SYMBOLISM RESEARCH: A SEGMENT OF THE NATIVIST--ASSOCIATIONIST DEBATE

The preceding discussion has attempted to illustrate the degree of polarization between the intellectual descendents of Plato and those of Aristotle within the disciplines of philosophy, psychology and linguistics. The associationists are true to Aristotle's goal of scrupulous observation and classification of phenomena. This group shows a tendency to limit observation to the microscopic level of analysis in hopes of gaining predictive control of it; one seeks the smallest possible unit of analysis. Typically, these units are understood to be additive building blocks of larger verbal behaviors which become complex in the learning and reinforcement history of the individual. Verbal behaviors are seen as meaningful only as they are reliably associated with referents in the environment; they carry no inherent meaning themselves. Consciousness and internal thought processes are not thought to be contributors to verbal behavior.

The idealist/nativist camp reacted against the atomistic, microscopic approach of the associationists and offered in its stead a holistic analysis of behavioral/cognitive phenomena and language. Experimentalists among the nativists felt that they had demonstrated

the existence of "wired in" perceptual skills which reaffirmed the Kantian notion of a priori. Some of these theorists stressed the importance of an organismic and ontogenetic unfolding of capacity as the organism matures and differentiates. Some of the linguists espousing nativist principles note consistencies of form, reference and syntax across languages which suggest to them a predisposing set for order of words and meaning in phonemic convention. They disputed as naive the Saussurian insistence on the arbitrariness of the sign.

The Gestalt influence on holistic conceptualizations of research was strong in Germany from 1920 onward. Von Hornbostel (1924) applied the doctrine of isomorphism to his synaesthetic view of perception which he discussed as "a unity of the senses." He reported informal experimental evidence for the matching of brightness perception across the modalities of olfaction, audition and vision. Depending largely on his introspective acuteness, Von Hornbostel isolated six dimensions for sound symbolism, one of the many facets of unity within the senses; these dimensions were intensity and rhythm, duration, pitch movement, pitch of voice, vowel brightness and consonant strength. A student of primitive language, Von Hornbostel used African tribal languages to support his isomorphic theory; many of these tongues are heavily melodic or tonal and make use of devices such as clicks and whistles. Usnadze (1924) took Von Hornbostel's notion of sense unity a step further and did a study requiring the matching of nonsense figures to a wide variety of sound complexes (door slamming, pot clanging, etc.). Percentage of agreement ranged from 25 to 45 among the six figures used.

In the United States, Edward Sapir (1929) is credited with initiating experimentation on the semantic properties of nonlinguistic words

and also with coining the phrase phonetic symbolism to account for these inherent properties. His approach was similar to that of Kohler, whose experiment was mentioned earlier, but there was an attempt to maintain better control over the stimulus materials. Instead of offering subjects the choice of two very different stimulus items (i.e., Kohler's takete and maluma) Sapir varied only the center vowel in a series of three letter words (CVC trigrams). Specifically, for the size dimension, Sapir asked subjects to consider that mil and mal might refer to tables of different size; he then asked the subjects to decide whether the mil or the mal was the larger of the two tables. Over 80 percent of the subjects assigned greater size to the mal, suggesting to Sapir that the letter a has greater magnitude sound symbolism than does i. Sapir varied the consonants in his stimulus words, and his results were stable. In comparing other vowel pairings, he noted the greater size symbolic difference was evoked for some vowel pairs (e.g., i and o, e and a) than for others (e.g., e and i, o and u). Newman (1933) did a replication of Sapir's study in which he attempted to map the change of the size of the oral cavity in relation to the vowel produced and the magnitude perceived by the subject. He found a consistent increase in magnitude perception as the tongue recedes in the mouth from the pronunciation of i to o.

Evidence contrary to the phonetic symbol phenomenon was cited by Bentley and Varon (1933) who used an experimental design very different from Sapir's or Newman's. Using a small number of trained observers, Bentley and Varon instructed these people to free associate to ten target CVC trigrams. They reported that none of the observer responses to their stimuli were suggestive of magnitude symbolism. These writers

concluded that the phonetic symbolism phenomenon was artifactual in that it would only appear in a forced choice situation. They argued that a genuine and potent phenomenon should occur spontaneously through free association.

In addition to research with nonmeaningful sound complexes, another branch of phonetic symbolism research developed which investigated a subject's ability to guess the meaning of words from an unfamiliar foreign language. Tsuru (1934) and Tsuru and Fries (1933) objected to the artificiality of the exercises using nonlinguistic stimulus materials and preferred to study the strength of the phonetic symbolism effect with living languages. The theoretical approach of Tsuru and others centered on the belief that more powerful inferences could be made concerning the innate properties of phonetic symbolism if subjects are able to sense the meanings of words in languages which have a different line of evolution from their own. Effort was made to insure ignorance of the target language by screening subjects at the outset and, in general, biasing selection to favor monolingual speakers. Tsuru's stimulus items were Japanese words presented visually (in transliterated form) in antonym pairs. The subjects, who had no familiarity with Japanese, were asked to match each stimulus pair with the appropriate English translation pair member presented simultaneously. Tsuru found that his subjects performed this matching task significantly above chance level.

Criticisms of Tsuru's methodology were raised by Roger Brown (1958), who noted that Tsuru, himself, selected the Japanese and English antonyms for use in the study. Brown suggested that the possibility of experimenter bias existed in an inadvertent preference for

stimulus items bearing similarity to English word pairs. Allport (1935) performed a replication of Tsuru's study and eliminated the potential source of bias by using a native speaker of a new target language (Hungarian) to make translations of Tsuru's English glosses into his own language. Since Allport's native speaker was ignorant of the purpose of the study, it was felt that his range of choice for foreign word pairs would be less subject to biasing constraints. Allport and his student, Rich (1953), who did a later replication, obtained statistically significant results in support of natural language phonetic symbolism.

Thorndike (1946) did an unusual study requiring the matching of 22 English phrases with 12 single nouns in English. No restrictions were placed on the number of times a noun might be used. Thorndike determined that each of the 22 phrases had a close semantic associate in one of the noun stimuli in ancient Greek. For example, the Greek word for hand was the equivalent for act or deed in that language. He wished to investigate whether English speaking students with no knowledge of Greek had any predisposition to pair English nouns and phrases in the ancient Greek manner. He found statistically significant agreement ranging from 27 to 90 percent for five of the 22 phrases and chance level agreement for the remaining 17 phrases. Thorndike interpreted his results as confirmation of the associationist position that signs acquire meanings through conventional habitual pairing rather than through any deep, innate connection.

Brown, Black and Horowitz (1955) were intrigued by the consistently potent results obtained by Tsuru, Allport and Rich, and they attempted to tease out methodological variance in yet a third replication of the

Tsuru experiment. Again they used blind translation of antonym lists into their three target languages, Czech, Chinese and Hindi. And again aural and visual (transliteration) presentations of stimulus words were made. Brown et al. again noted overall significance in favor of the phonetic symbolism phenomenon ($p < .01$). Closer scrutiny of individual word pairs revealed a high degree of item variability in terms of phonetic symbolism potential with about half of the pairs reaching the .01 level of correct judgment and one quarter achieving the same level for incorrect judgment. In a manipulation which compared visual only to visual plus auditory presentation of stimulus words, it was noted that in the visual only condition the number of significantly correct judgments dropped off markedly while the number of significantly incorrect judgments dropped to zero. Apparently, the contribution of voice expressiveness is inconsistent and unreliable though potent. One chief finding in this section of the study was the seeming robustness of the visual only presentation. Unfortunately, Brown et al. used considerably fewer subjects in their visual only condition ($n = 16$ vs. $n = 36$ in the visual plus aural condition); this greatly decreased degrees of freedom and made it difficult for many individual pairs to achieve significance (even though the mean percent correct score was 61.5 overall). Noting overall high guess rates across widely divergent language groups, these investigators concluded that the phonetic universals hypothesis was confirmed. However, they were reluctant to ascribe to a nativist position, claiming that widespread associationist processes could have occurred in distant linguistic history.

A replication of Brown et al. was done by Maltzman, Morrisett and Brooks (1956) using Japanese and Croatian as test languages, and they

achieved a very high level of significance for that portion of their study which was essentially identical to Brown et al. ($p < .0001$). Maltzman et al. introduced an innovation requiring subjects to match two sets of foreign words rather than an English word to its foreign equivalent. These investigators reasoned that a foreign-foreign pair match would provide a more rigorous test of the phonetic universals hypothesis, since the physiognomic speech mechanisms postulated by nativist theorists should operate even if a subject were ignorant of both languages used. Performance did not exceed chance level in this condition, and these investigators discounted the findings of the first part of their study to conclude that phonetic symbolism was disconfirmed.

In an exceptionally well controlled and comprehensive study, Brackbill and Little (1957) probed the phonetic universals hypothesis along a number of dimensions. Manipulations included varying language pairings (English-foreign vs. foreign-foreign) and mode of stimulus word presentation (auditory alone, visual alone and auditory and visual together). Instead of using antonym pair comparisons as had been done by Tsuru, Brown et al. and Maltzman et al., Brackbill and Little's design required subjects to state whether two simultaneously presented words meant the same or different things. Results they achieved were interesting in that they were different from those of Brown et al. and also from those of Maltzman et al. Significance levels were not nearly as high as those obtained in the antonym pair research of Tsuru, Brown et al. and Maltzman et al., and there was no consistent pattern across modes of presentation or language pairs. Also, whereas Maltzman et al. noted nonsignificant findings for a foreign-foreign (Japanese-Croation)

antonym pairing, Brackbill and Little reported some of their most significant findings in the foreign-foreign conditions (Chinese-Japanese and Hebrew-Japanese).

A study examining antonymic and same/different judgment tasks was done by Brown and Nuttall (1959), and, unfortunately, their findings did offer ambiguous answers to the theoretical questions raised in this discussion of modes of presentation. As expected, they did find that their subjects achieved greatest success in guessing word meanings in the English-foreign antonym pair task ($p < .0001$); lowest but still statistically significant performance levels were obtained for the foreign-foreign antonym task ($p < .05$). Paradoxically, intermediate success was seen on the same/different judgment task for the English-foreign condition ($p < .01$). These findings were contrary to the investigators' hypothesis which followed Sapir's and Newman's formulation regarding the necessity of providing dimensional pairs on which the subject can then form hypotheses. Presumably such tentative hypotheses would use information communicated in the vowel-consonant combinations relating to magnitude, brightness, etc. Brown and Nuttall's conclusion overlooks this contradiction and reports the superiority of the English-foreign over the foreign-foreign group as confirmation of the existing theory which suggested the need for "anchoring" the subject in a familiar semantic dimension.

Weiss (1963, 1966) conducted further investigations of the need to use antonym pairs in phonetic symbolism research. In his first study Weiss compared a condition in which English and foreign word antonym pairs were presented to another condition in which words were scrambled and presented in randomly mixed pairs. Essentially two hypotheses were

tested: a) if antonyms were necessary, then subjects in the first condition only should achieve significantly correct guessing and b) if antonyms were not necessary but somehow aided the guessing procedure (assuming subjects in both conditions achieve significantly correct guessing), then subjects in the first condition should do significantly better than subjects in the second. The findings showed that subjects in both conditions achieved significantly correct guessing and there were no differences between them. Weiss's second study was an attempt to control for the possibility that subjects might have implicitly supplied the missing antonyms and thereby unscrambled the mixed list; control was instituted by altering mixed stimulus items to include random nonantonym English word pairs to be matched with a single Japanese word. Again significantly correct guessing was obtained ($p < .01$). Weiss's overall conclusions were that "meaning dimensions," as offered in an antonym pair, is far less crucial than the availability of "meaning categories" provided by a comparison context. He asserted that subjects make use of as much information as they can, including dimensional information, but that their scope for internal hypothesis formation--perhaps based on innate capacity--is very broad. It follows then that weak performance seen in same/different judgment tasks is more a factor of low information yield than absence of polar dimensions.

Following his investigation of antonymic and nonantonymic word pairs, Weiss (1964) became involved in a theoretical debate with Taylor (1963) and Taylor and Taylor (1965) on the origins of the phonetic symbolism phenomenon. The Taylors maintained that differences among languages in terms of their attribution of meanings to vowel and consonant combinations were far greater than the similarities the various

language groups shared. Consequently, they proposed a theory based largely on associationistic principles which stated that a given language would over the centuries come to exhibit a phonetic symbolism that would be unique to its own speaking community; they felt that variability within the data reported in the literature augered against the concept of phonetic universals. Their proposed theory asserted that a feedback mechanism will develop between subjective phonetic symbolism (exhibited by individuals) and objective phonetic symbolism (of language cultures); usages will fluctuate along a feedback loop over time to account for the evolution of word meanings and the latent meanings which may be experienced in obsolete speech patterns.

Weiss suggested his own theory to account for the variability in reported research results on phonetic universals. He reiterated his notion that an individual tends to derive information from a "meaning context" from the available cues, antonymic and otherwise. By extension, these cues become synthesized into implicit (perhaps unconscious) hypotheses which are then tried out in a test situation. Weiss explained that several different hypotheses might be entertained because of the likelihood that meaning correspondences with phonemes are not absolute but are, rather, relative and dependent upon context. Therefore, many meanings may be associated with a given phoneme, and their relative frequencies will determine a hierarchy of usage within a particular language group and also between language communities. Consequently, substantial variability among language cultures will be noted with respect to phonetic symbolism; this variability tends to shrink somewhat when constraints are placed on a subject's set of alternatives--as, for example, occurs in the antonym pair task--and he

is forced to sample meanings from several levels of his phonetic symbolism hierarchy. This theory would suggest that a free association task such as Bentley and Varon's would tend to yield poor results because one is not forced to sample a semantic hierarchy.

Werner and Kaplan (1963) described the same kind of phenomenon in their discussion of language acquisition. Due to the relative globality and undifferentiated state of the young child's linguistic capability, his speech is characterized by unarticulated babbling. At this stage, Werner described the child's experience of sounds as plurisignificant, that is, able to reference many things in the environment. With increasing articulation and differentiation, the child's speech matures, and distinct preferences for associating sounds to words is noted. But Werner was aware of the danger inherent in viewing this process as rigid and inexorable, leading to the definite association of one phoneme to one word complex. He referred to the latter assumption as "the fallacy of constant elements."

It has been suggested that plurisignificance or hierarchies of meanings for words in a natural language provides the source of poetic, figurative usage that is characterized by its connotative and affective qualities. In the late 1950's Osgood, Suci and Tannenbaum (1957) pioneered a factor analysis technique for assessing the connotative, semantic content of words along a large number of attribute dimensions. It was observed that subjects showed remarkable consistency in their assignment of concepts to the semantic continua. Many of these connotative, metaphoric associations were readily recognizable as familiar poetic devices and figures of speech, e.g., the greenness of envy or the heaviness of sorrow. Other consistently chosen associations

appeared rather peculiar and puzzling, e.g., the sweetness of a boulder.

As the data became analyzed, Osgood et al. discovered that three main factors accounted for approximately 70 percent of the variance; these factors were labelled evaluation, potency and activity. Since these factors were orthogonal, the authors began to speak of charting concepts in three-dimensional octants of "semantic space." The technique became called the Semantic Differential, and it became a research tool to help evaluate the merits of nativist vs. associationist positions in explaining semantic/linguistic commonalities and disparities. One of its more prominent uses was in examining the Whorfian hypothesis that cognitive structures are a product of the syntactic and semantic constraints imposed by various languages (Whorf 1962). Although studies using the Semantic Differential were far from unequivocal, they did offer moderate support to the alternate position, namely that cross-cultural universals of affective and connotative meaning do exist. Some of the less obvious dimensional consistencies, which Osgood chose to see as synaesthetic tendencies, may be part of a semantic domain of a higher order than that occupied by more denotative and immediately apparent definition. In this connection, the reader will recall an earlier discussion of the Gestalt theorist, Von Hornbostel, and his concept of the "unity of the senses." Interestingly, McMurray (1960) reported that percentages of agreement among his subjects were no higher--and often were lower--when actual denotative synonyms were offered in a guessing task; McMurray's study was an attempt to adapt word pairs used by Brown et al. (1955) to analysis through the semantic differential method. (It will be recalled that

Brown et al. used stimulus antonym pairs drawn from Czech, Hindi and Chinese.) McMurray's task required subjects to assign Semantic Differential scale values to each pair member belonging to the foreign word stimulus list. This meant that each word received a scale value along many continua (e.g., hot-cold, fast-slow, etc.). McMurray interpreted his findings of high agreement for denotative meanings and also high agreement for meanings that appear to be more connotative as support for phonetic symbolism.

Investigation of the connotative impact of nonlinguistic stimulus items was pioneered by Iritani, a student of Werner. Pursuing Werner's notion of plurisignificance, Iritani constructed 35 nonlinguistic sound patterns and instructed his subjects to free associate responses to each pattern. This generated a very large amount of material which Iritani recorded and analyzed. Initially, he found very few instances of identical agreement between any two subjects; however, he did note some interesting consistencies when he subjected his results to more general dimensional analysis. Specifically, he compared his subjects' responses using six dimensional criteria (e.g., size, shape, brightness, etc.), and his findings strongly suggested consistency of expressive properties in many stimulus items. Iritani did a follow-up experiment using these same items, but the second study limited subjects' responses to the six dimensions he employed in post hoc fashion in the first study. His results revealed overwhelming agreement among subjects as to the expressive quality of sound patterns using this continuum marking procedure; in general, consensual choices were elicited along more than one dimension. In fact, in some instances a sufficient number of similar dimensional fixes were evoked to suggest

synonymity and antonymity among the sound complexes. For example, it was found that ZECA and TAKI elicited the expressive values of smallness, angularity, brightness, motion and happiness; whereas, SALO, VOAG and HULO were related to largeness, roundness, darkness stasis and sadness (Iritani 1962).

Iritani's success stimulated the work of other students of Werner in the area of phonetic symbolism and psycholinguistics. Langer and Rosenberg (1964) pursued the line of research initiated by Iritani's nonlinguistic sound complexes, but they used subjects to indicate their own choices for association with specific spatial and color concepts. Subjects made their selections from a large pool of nonlinguistic words presented to them in written form by the investigators. The same pool of stimulus items was then re-presented to another group of subjects at another university, and results showed remarkable agreement between groups of subjects in terms of this tendency to associate color and form meanings to particular nonlinguistic words.

In order to examine the potency of these word complexes, or phonetic symbols, in terms of their efficacy to facilitate or inhibit memory storage, Langer, Sampson and Rosenberg (1966) designed a paired-associates learning task in which selected phonetic symbols were paired with color names. Pairs were defined as congruent if subjects from the norming study had consistently designated the symbol-referent pairs as matches (e.g., ZAH-RED, NERD-GREEN). Noncongruent pairs were those in which a phonetic symbol had not been matched with the referent but which had rather been paired with another color. Unrelated pairs were those in which the symbol had previously evoked an equiproportional distribution of choices within the color dimension (of four possibilities) and

hence a random assignment of referent to symbol was made. The authors hypothesized that: a) pairs of phonetic symbols and congruent referents would be learned more readily than phonetic symbols paired with noncongruent or unrelated referents, b) more errors would be made with noncongruent pairs and that these errors would tend to be congruency errors, i.e., response referents chosen previously by the normative group, and c) congruent and noncongruent pairs would be learned more easily than unrelated pairs. All of these hypotheses were confirmed.

If occurred to Langer and Rosenberg (1966) that the phenomenon of congruency (or incongruency) of word-color association had already been amply researched for decades by psychologists using the Word Color Interference Test (WCIT) developed by Stroop (1935). Stroop's original WCIT demonstrated that ordinary verbal symbolic activity, i.e. reading, can interfere with task orientation when two modes of symbolic processing are discrepant with one another. Discrepancy was induced when subjects were presented a list of color names printed in ink colors different from the printed name; longer latency in naming the ink color was noted in this condition. Langer and Rosenberg constructed an adaptation of the WCIT by substituting a phonetic symbol for the color name for which it showed maximum equivalence. Thus ZAH was used for red, NERD for green, etc. These investigators predicted that the phonetic symbols appearing in print color discrepant with their associated color should evoke the same interference effects as do the noncongruent color names in the WCIT. This prediction was supported.

In a further demonstration of the potency of color phonetic symbols, Langer, Stein and Rosenberg (1969) directed their research to a psychiatric population. They carried out a modification of a study done

by Wapner and Krus (1960); the latter study found that schizophrenics evidenced greater interference (longer latencies) than normals on the WCIT. Wapner and Krus used Werner's Orthogenetic Principle of development to explain this finding; they reasoned that schizophrenics should show a lower level of linguistic development and hence should manifest greater globality and less articulation and differentiation of linguistic symbol. This would imply a merger of symbol with referent and consequent frustration in one's attempts to maintain sufficient cognitive flexibility to shift from one dimension of the stimulus to another. Wapner and Krus stated that this loss of flexibility created confusion in the schizophrenic subjects and produced greater interference effects on the WCIT.

Langer, Stein and Rosenberg shared a theoretical orientation similar to that of Wapner and Krus, in that much of their doctoral training had been in the organismic developmental conceptualizations of Heinz Werner. Consequently, Langer et al. predicted that interference effects in schizophrenics on their color phonetic symbol test would parallel those found by Wapner and Krus on the conventional WCIT. Specifically, they predicted that schizophrenics would show much more disruption than normals when reading color phonetic symbols printed in colors discrepant with their norm-determined appropriate color. This experimental hypothesis was confirmed. Although response latencies were higher in schizophrenics overall, the schizophrenic subjects manifested a significantly greater difference in response latency between congruent and noncongruent stimuli than did normals. The significance of this study would appear to be two-fold: first, it fortifies previous research by Langer and his associates by offering further

demonstration of the potency of phonetic symbols to elicit behaviors similar to those elicited by conventional words, and, secondly, it suggests an intrinsic advantage for the decoding and manipulating of phonetic symbols in persons free of gross psychopathology or psychosis.

If the explanation offered by Wapner and Krus for greater WCIT interference effects in schizophrenics is valid, it points to a basic difference in skill at reconciling discordant experiences at two levels of processing: the perceptual (seeing the color) and the cognitive (reading the color). For normals, such reconciliation is automatic because of a high degree of internal hierarchical cognitive governance which permits the person to disregard the irrelevant characteristics of the stimulus so that he can report on those characteristics that are demanded. The fact that schizophrenics, who show a deficit in reconciling discrepant perceptual and higher order cognitive processes, also show a corresponding deficit on the phonetic symbol version of the WCIT suggests, perhaps, that similar cognitive and linguistic developmental plateaus must be achieved in order for a person to tap the realm of semantic/phonetic universals. In other words, perhaps it is true that the processing of both conventional word concepts and unconventional phonetic symbols requires a high level of differentiation and articulation (to use Werner's terminology).

Low levels of differentiation and articulation are seen in the language of the child because there is insufficient maturation to support fully logical cognition and discrimination, i.e., what Piaget called formal operations (Piaget and Inhelder 1969). Similarly, poor capacity for differentiation and articulation are present in the language of the schizophrenic because of recurrent conceptual errors which

characterize the content of his verbal expression. Consequently, many researchers have regarded the language of the schizophrenic as a clear marker for a thought disorder, which is the defining criterion of this psychotic condition.

PRIMARY PROCESS: PATHOLOGICAL AND NONPATHOLOGICAL MANIFESTATIONS

Most psychoanalytically oriented writers have assumed that the schizophrenic's loss of capacity for logical, organized thought has resulted from the interference of uncontrolled drive and instinct. Freud believed that the schizophrenic was dominated by uninhibited, uncensored and instinctual cognition whose only rule required the immediate gratification of needs and reduction of drive tension; this type of cognition he named primary process thought. He contrasted it with secondary process thought, which is logical and oriented toward the demands of daily reality; it tends to block instinctual, affective expression and to censor taboo wishes. When expressed in speech, primary process will tend to be illogical, affective and full of sexual and aggressive content; it may also have a poetic or metaphoric quality. Secondary process speech is factual and nonaffective but capable of expressing clear, logical ideas (Freud 1969).

Von Domarus (Arieti 1974) synthesized a theory on the uniquely delusional components of schizophrenic primary process as evidenced in verbal expression. He dichotomized secondary and primary process into two new categories designed to elucidate differences contained in their respective logical assumptions. Secondary process is associated with Aristotelian logic, which clearly defines the admissible steps for generating true conclusions from a set of antecedent statements in the

form of syllogism. Paleologic, by contrast, is not bound by external criteria for developing assumptions about the world; in this instance the progression of thought will be highly personal and idiosyncratic. An example of such a personalized and extraordinary reasoning progression is cited in the statement of a patient: "the Virgin Mary was a virgin; I am a virgin; therefore, I am the Virgin Mary." A more succinct and conclusive way of describing the reasoning flaw in the pseudo syllogism is to call it a confusion of predicates. Specifically, whereas a normal person will accept identity only on the basis of identical subjects, the schizophrenic will tend to conclude identity on the basis of identical predicates. Consequently, schizophrenics will take paths to conclusions very different from those followed by normals capable of standard logical operations in their daily lives. However, von Domarus noted that the paleologic of the schizophrenic is susceptible to analysis if the listener is willing to suspend logical, sequential processes and attempt a more global, metaphoric appreciation. In the example of the Virgin Mary cited above, the patient's therapist was able to help her when he was able to understand her need to identify with Mary as a symbol of human perfection. It should be noted in passing that von Domarus assigned the name of paleologic to schizophrenic verbal contents because of an implicit assumption that psychotic thought was akin to that of aboriginal man.

It has long been assumed that a relationship exists between the schizophrenic error of equating predicates and the poet's skill in creating interesting and fresh metaphor. Both were said to permit primary process thought to rise to a dominant position in the life of the adult individual. It has been argued that the products of the poet

(artist, musician) are easily distinguished from those of the schizophrenic in terms of the level of discipline that the poet employs in expressing primary process material. Whereas there may be considerable similarity between the poet's and the schizophrenic's skill in accessing primary process material, the two are thought to differ radically in their ability to make sense of instinct-laden thought and then to communicate it to others. The poet is successful to the extent that he can generate highly affective material and then communicate this affect to a broad audience through the use of metaphor and connotative language. The schizophrenic, by contrast, is unable to integrate, organize or communicate the intense affect such that others can readily share in his experience. His inner experience is said to be autistic and highly idiosyncratic; it is discernible only to the person who is able to decipher its personal meanings and paleologic. Some current psychoanalytic theorists describe the creative event as necessarily involving two separate cognitive phenomena: first, the fluent generation of primary process material in any and all forms, and, secondly, the subjection of these thought contents to reality-oriented secondary process. It is the latter step that saves the whole experience from being autistic, overly personalized or narcissistic (Suler 1980).

Ernst Kris (1952) understood the successful creative act as a genuinely healing or self-enhancing activity. He described the creative act as a form of adaptive regression, or "a regression in the service of the ego"; he believed that optimal mental health required periodic loosening of the strictures of adult logic in hopes of expanding one's awareness through the exercise of latent primitive or childlike capacities. Whereas the risks of total capitulation to primary process

might be psychotic decompensation, the complete adherence to secondary process could lead to characterological rigidity, emotional insensitivity, empty ritual and lack of humor.

During the 1950's and 60's the distinction between adaptive and maladaptive regression gained currency in psychological circles, and this, in turn, generated interest in the assessment and measurement of primary process. Traditional projective tests such as the TAT or Rorschach were logical choices for this task because of their capacity to elicit material in an open-ended, unrestricted fashion. Research projects attempting to establish the reliability and validity of various techniques began to multiply. One of the more successful efforts in the measurement of primary process was that of Robert Holt (1956, 1966, 1970) who developed a means of distinguishing adaptive and maladaptive primary process using the Rorschach Inkblot Test. Basically, Holt developed a technique to evaluate two aspects of primary process: 1) the extent to which a response is drive-dominated (or suggestive of sexual and/or aggressive meaning) and, 2) the degree to which the response accommodates to the demands of external social reality. His goal was to identify three main groups of persons according to their Rorschach response tendencies. In ascending order of research interest, these were 1) persons whose dominant mode of response is through the use of secondary process and who show virtually no evidence of drive-dominated material, 2) persons who make heavy use of drive-laden material but whose attempts to make their responses socially acceptable are ineffective; members of this group typically show considerable perceptual distortion and often exhibit psychotic

tendencies, 3) persons who produce a generous amount of drive-laden content but who are able to mold their responses into socially appropriate form.

Intensive research activity has centered on the personal characteristics of individuals in the third group because of the presumed adaptive use of primary process. In Kris's language, one would expect this group to best manifest "regression in the service of the ego." Studies in the areas of creativity (Pine and Holt 1960), level of developmental maturity (Wulach 1977), and positive effects of psychotherapy (Fishman 1973) have supported hypotheses that subjects with high adaptive regression scores will also show more originality, fluency, creativity, maturity, flexibility and willingness to attempt personal change. Research on hypnosis has had mixed results; highly susceptible psychotic subjects have shown significantly higher adpative regression scores than nonsusceptible psychotics, but normal subjects have shown no difference with respect to adaptive regression (Lavoie, Sabourin, Ally and Langois 1976; Fromm, Oberlander and Gruenwald 1970).

Holt (1960) did a study examining the relationship between primary process and interference on the Stroop Word Color Interference Test. Using normal subjects, Holt discovered that persons showing little interference on the WCIT tended to give Rorschach responses manifesting a significantly greater amount of primary process than persons experiencing high interference. Holt also found that persons showing high interference on the WCIT tended to give a paucity of primary process content in their Rorschach protocols; however, he noted considerable squirming and nervous laughing during administration of the Rorschach, suggesting greater discomfort in dealing with their primary

process thought. This observation is consistent with other research suggesting more maturity and greater cognitive and affective differentiation in subjects registering high adaptive regression scores on the Rorschach. Following Werner's formulation, one could speculate that greater impact of affect suggests more concrete processing of percepts, or, in the extreme case, loss of separation between real objects and percepts. For example, if a vulva is seen on one of the Rorschach cards, greater embarrassment and interruption of cognition would occur in a person for whom inkblots become confused with real objects. Although such events are usually restricted to psychotic subjects, they are not terribly rare. Holt provided the following affect-laden response in his manual: "Oh what a disgusting beetle; looks like he's coming at you; take it away, please!"

In the area of linguistics, the deficient performance of schizophrenics on the WCIT has already been cited by some theorists as evidence for merger of referent with symbol. It will be recalled that this explanation was used to account for longer latencies in the responses of schizophrenic subjects to stimulus color names printed in discrepant colors. Conversely, this explanation would maintain that short latencies on the WCIT suggest skill at keeping referents and symbols separate and, hence, greater cognitive maturity. Perhaps, also, the analogous process of keeping Rorschach percept separate from actual object permits the mature person (i.e. one who uses adaptive primary process) to report instinct-laden percepts without experiencing disabling inhibition. If it is true that the phenomenon of inhibition on the Rorschach and on the WCIT has a common source, then one might expect analogous disruption of phonetic symbol decoding among persons showing

little adaptive use of primary process. Conversely, persons with ready access to adaptive regression should be superior in decoding phonetic symbols. It will be recalled that the Color Phonetic Symbol Test showed results parallel to those obtained on the WCIT when performance of schizophrenic and normal subjects was compared.

Psychodynamic theorists outside of the Freudian tradition have developed theoretical dichotomies similar to the primary/secondary process distinction made in classical psychoanalysis. For example, in the analytical psychology of Carl Jung, a typology of polar opposites is discussed, and persons are classed according to their placement on three typological continua, whose are the following: thinking-feeling, introversion-extraversion, intuition-sensation. The last of these continua, intuition-sensation, is the closest analog to the primary/secondary process dichotomy in Freudian psychology, since, for Jung, intuition represents one's skill at accessing the contents of the unconscious (i.e., instinctual, primary process thought) and sensation refers to one's capacity to use his five senses to understand the outer world. Presumably, sensation is more akin to secondary process thought in that both require sequential, contiguous processing of information; both are rigorous, step-by-step operations. Intuition, by contrast, can violate sequential order by leaping ahead to a conclusion when a critical number of elements in a problem bears a similarity to a previously encountered situation.

A personality test based on Jungian type theory was developed by Myers in 1962. This test, the Myers-Briggs Type Indicator (MBTI) has been used extensively in various areas of psychological research, and moderately strong evidence supporting the validity and reliability of

the MBTI has been generated. Carlyn (1977) summarized the existing experimental literature on the MBTI dealing with the issues of internal consistency, stability, content validity, predictive validity and construct validity; she concluded that the MBTI is an "adequately reliable self-report inventory . . . measuring dimensions of personality which seem to be quite similar to those postulated by Carl Jung." With respect to research in creativity, Richter and Winter (1966) found that highly creative subjects (so judged by virtue of their high intuition scores) gave significantly more responses containing definite form, color, movement, human content and abstract content on the Holtzman Inkblot Test than did subjects rated as low on creativity; these inkblot test indices are also regarded as correlates of spontaneity, maturity and complex cognition. In a study analyzing skill in interpreting emotional expression in photographs, Carlson and Levy (1973) found that intuitive types were significantly more accurate than sensing types.

Carlson and Levy's finding points to an adjunct area of interest to the present study, namely the relationship between interpersonal sensitivity and skill in accessing linguistic/phonetic universals. It has long been assumed that interpersonal sensitivity, or empathy, is an attribute of persons who are most in touch with their unconscious processes--or high intuitors, in the Jungian conceptualization. Carlson and Levy's study suggests support for this notion, but it would be useful to see if other indices of empathy also relate to strong intuition function. The nature of empathy has been variously described by writers to mean either a highly primitive function witch communicates emotion through a process of contagion or a more sophisticated

cognitive function which "reads" persons from a distance (Mehrabian and Epstein 1972; Feffer and Suchotliff 1966). Do either of these empathic mechanisms correlate with nativist apprehension of meaning in human speech sound? If so, perhaps the understanding of the nature of empathy must be broadened to include a previously unappreciated linguistic component.

The relationship between intuition and primitive word meanings was explored in a dissertation by Adair (1974). Using the intuition-sensation subscale of the MBTI he identified subjects who fell at the extremes on this continuum. All subjects were instructed to give free associations to neutral, ordinary English words such as pencil and fire. These responses were then rated for their latent archaic content by independent judges. Adair found that subjects high on intuition gave significantly more archaic and instinct-laden responses than did subjects low on intuition. If the MBTI proved to be useful in selecting persons with ready access to primitive meanings of English words, perhaps it could also differentiate persons with skill at decoding phonetic symbols. This hypothesis would assume that Adair's task initiated a regressive process which drove linguistic evolution backwards, tapping into complexes of phonetic universals which could probably have been simplified to even more basic semantic components.

STUDIES IN HEMISPHERE ASYMMETRY: LANGUAGE AND AFFECT

There is a growing body of literature suggesting that human neurophysiology is reflective of the dichotomy between primary process thought (intuition) and secondary process thought (sensation); this research concerns itself with the phenomenon of asymmetry of function

between the two cerebral hemispheres. In general, investigators have discovered that the left hemisphere specializes in verbal, analytic and logical thought; whereas, the right provides a more global, aesthetic, spatial and emotional cognitive function (Kimura 1973; Benton and Van Allen 1968; Nebes 1974).

Until recently, it had been assumed that the left hemisphere has total control of human language function; this was believed to encompass language in both its spoken and written forms. Parenthetically, it is necessary here to specify that this discussion relates to the vast majority of the population who are right-handed; left-handers are somewhat more variable in terms of dominance for language function, but a clear majority of them show left hemisphere control of language (Hecaen and Sauget 1971).

Several sources of evidence have been used as support for the dominance of language in the left hemisphere. One major corpus of evidence, which is continually corroborated through neurological and neurophyshological assessment of brain damage, is the brain lesion research. Very early on, it was noted that the incidence of language deficit with damage to the left hemisphere was 70 percent; in cases of right hemisphere damage, incidence drops to one or two percent (Penfield and Roberts 1959; Russell and Espir 1961). Another well documented reference for left hemisphere language comes from research using the Wada test, a rather hazardous anesthetization of either hemisphere by injection of sodium amytal into the ipsilateral carotid artery; this has been done as a means to establish language localization prior to surgery. It has been found that left carotid injection interrupts speech in 90 percent of right-handers tested and that only 10 percent

experience disruption when administered sodium amytal on the right (Branch, Milner and Rasmussen 1964). With respect to surgical evidence, until very recently, researchers have reported that patients who have experienced isolation of the left hemisphere, either through disconnection of the hemispheres (commissurotomy) or through actual removal of the right hemisphere (hemispherectomy), show normal or near normal language function (Gazzaniga 1970; Smith 1974).

Two means of studying the intact normal subject have been through experimental methods using dichotic and split field techniques. In dichotic listening research, competing messages are introduced to the two ears of normal subjects; the typical finding is a right ear advantage. Since 60 percent of the auditory neurons cross to the contralateral side, a right ear advantage implicates left hemisphere processing (Kimura 1967; Studdert-Kennedy et al. 1972). In the visual modality, input can be addressed separately to the two hemispheres by means of split field technique; this method requires presenting stimuli via tachistoscope in order to prevent lateral eye movements. Verbal material has consistently been more readily recognized in the left hemisphere than in the right (McKeever and Huling 1971; Moscovitch 1976). An interesting difference between split field and dichotic studies relates to the neurophysiology of crossing nerve tracts to the contralateral side; whereas, 60 percent of the pathways for audition are contralaterally registered, a full 100 percent crossover occurs in split field visual studies.

Evidence for the unique contribution of the right hemisphere to language capacity involves a much more recent and more circumscribed body of literature. Filskov and Boll (1981) have made an interesting

distinction between the left hemisphere's analytic functions and the right hemisphere's pragmatic functions. They understand pragmatics to involve the use of a system of rules that explicate the appropriate utilization of language in a particular situational context. These authors offer the example of a pragmatics problem in a person's response to the question, "Can you pass the salt?" To respond by answering "yes" and then failing actually to pass the salt would exemplify a correct grammatical, left hemisphere response but an incorrect solution to the right hemisphere pragmatics of the situation; in effect, the person would have dealt with the surface structure of the sentence without appreciating it as a request. Such errors are prevalent in persons sustaining damage to the right hemisphere.

Studies of persons with right hemisphere damage report evidence that is consistent with Filskov and Boll's notion of pragmatics. For example, Gardner and Denes (1973) tested right hemisphere patients who were unable to comprehend the use of common metaphors (e.g., "He was wearing a loud tie.") because of an overriding concreteness and literalism. Difficulty in appreciating humor and in choosing the correct sequence for a story arrangement task was noted by Wapner et al. (1981). Caramazza et al. (1976) reported that persons with right hemisphere damage showed significantly worse performance in comprehending verbally expressed visuospatial relationships. Taken together, these findings offer support for the role of the right hemisphere as the interpreter of metaphor, interpersonal context and spatial relationships. In addition, the pragmatism to which Filskov and Boll refer points to an important executive function which synthesizes the surface verbal input into a richer and more interpersonally appropriate

message. The pragmatically correct response to the question, "Can you pass the salt?" implies an affective and empathic component which effectively translates the question to its intended form (i.e., of a request) and knows automatically to disregard its surface representation. Although Chomsky (1980) was primarily concerned with other kinds of syntactical issues when he proposed the idea of deep structure, it would seem appropriate to consider the possibility of structural invariance underlying the rules of right hemisphere pragmatics.

Adair's (1974) dissertation study of archaic word meanings employed a hemisphere asymmetry manipulation in addition to the already mentioned intuition-sensation dichotomy. He discovered that monaural presentation of stimulus words yielded significantly more primitive responses when introduced to the left ear than to the right. Since 60 percent neural crossover occurs in audition, the majority of the stimulus material was registered in the contralateral hemisphere. Therefore, the right hemisphere produced more primitive responses. This finding is consistent with the pragmatics literature to the extent that the right hemisphere engaged material that was affectively tagged because of its unique semantic evolution. Perhaps, in a similar fashion, the right hemisphere would have more ready access to even more archaic contents in the form of phonetic symbols.

In addition to these linguistically based studies supporting right hemisphere mediation of affect, several recent studies point to a general dependence on right hemisphere control of affective expression and comprehension. Examples of these appear in Tucker's (1981) monograph on laterality, cognition and emotion; experimental evidence was cited on brain damaged and neurologically intact populations. In

general, findings from studies on subjects with right hemisphere lesions suggest deficits in judging emotional mood of a speaker, communicating of affect through tone of voice, or comprehending facial expression of emotion (Heilman et al. 1975; Tucker et al. 1976; Cicone et al. 1979). A sampling of research on normal subjects revealed consistent left lateral eye movements in the presence of emotional stimulation and left ear superiority for the judgment of a speaker's tone of voice; both of these findings implicate right hemisphere processing (Tucker et al. 1977; Safer and Leventhal 1977).

THE PRESENT STUDY

The present study attempts to reexamine many of the issues which have continued to spark controversy in the fields of linguistics and psychology. Specifically, it is directed at the question of inherent meaning in human speech sound. It is proposed that many of the issues raised in the phonetic symbolism research may be susceptible to further study using adaptations of psychodynamic and organismic developmental theories. Extensions of the research of Langer, Holt, Adair and others are joined to explore the general hypothesis that more direct apprehension of phonetic symbols should be related to more ready access to primary process thought. A closely related hypothesis considers the notion that intuitive interpersonal sensitivity entails ready access to primary process and the ability to decode archaic meanings.

The possibility of primitive meanings in the phoneme is to be examined using a number of research strategies. The Myers-Briggs Type Indicator (MBTI) has been used effectively in the past as a screening device to identify persons at the extremes on attributes such as

creativity, accuracy in judging emotional expression and ability to appreciate primitive or instinctual content in common English words (Richter and Winter 1966; Carlson and Levy 1973; Adair 1974). All three of these areas would appear to reflect skill in adaptive regression, and the Adair study on primitive meanings may logically constitute a subset in the larger research concern of phonetic universals. Consequently, the MBTI will be used as a preliminary screening instrument to select subjects from a large pool to represent extremes on the intuition--sensation dimension.

Related to the notion of intuition in the study of phonetic universals is a set of nativist assumptions held in common with Gestalt psychology concerning the perceiving of wholes or a priori forms. The skill of an individual to appreciate pragnanz, or the quality of wholeness in a visual stimulus array, has been examined using a variety of instruments inspired by Gestalt psychology. Most of these tests require the subject to guess what is portrayed in degraded or incomplete stimulus pictures. In an early effort by Street (1931) a test was developed which consisted of a set of degraded pictures of common objects such as telephones, railroad engines, etc. A more recent test by Mooney (1957) used ambiguous human faces as stimulus items. The latter test is probably an improvement over Street's set of items simply because of its use of more phylogenetically relevant stimulus material; it will be recalled that Fantz (1958) demonstrated the presence of unique and arousing stimulus properties in the human face. Within the context of clinical neuropsychology, Lansdell (1968) has used the Mooney faces task to assist in diagnosis of right hemisphere lesion; clinical experience documenting a host of deficits in the perception of synthesized

wholes (e.g., constructional dyspraxia, prosopagnosia, etc.) resulting from right hemisphere damage justified the use of this task. If poor performance on the Mooney faces is suggestive of impaired right hemisphere function, then, by extension, better performance on this task would imply superior right hemisphere function, particularly in the processing of whole percepts. To the extent that phonetic symbols represent a priori percepts of linguistic meaning, the Mooney task would appear to be a good candidate to discriminate persons according to skill in the apprehension of linguistic a priori. Adequacy of right hemisphere function is also a correlate of accurate comprehension of affective and interpersonal contextual cues of linguistic material (Wapner et al. 1981). For these reasons, the Mooney task will be used in the present study as a measure of right hemisphere perceptual skill.

A further effort to tap right hemisphere linguistic function will build on the findings of Adair (1974) which are suggestive of a role for the right hemisphere in the appreciation of unconscious meaning of standard English words. His technique involved the direct introduction of stimulus material to either hemisphere using the auditory channel via the contralateral ear. Although he achieved significant results using this technique, it is important to note that in audition studies there can only be 60 percent concentration in one hemisphere because the neural pathway splits to permit ipsilateral as well as contralateral registration of auditory stimuli (Noback and Demarest 1972). The present study will attempt a modification of Adair's methodology in order to increase the concentration of stimuli transmitted to the opposite side hemisphere. This will be accomplished through substitution of a visual split field design for the unilateral aural presentation

method. Visual split field studies do assure 100 percent crossover to the hemisphere contralateral to the site of stimulation.

A fourth manipulation will involve use of the Rorschach Inkblot Test following the scoring protocol developed by Holt (1970). A large body of research supports this system as a reliable method to distinguish primary from secondary process cognition and, perhaps of greater interest, adaptive from maladaptive use of primary process. Evidence for the adequacy of this system has been cited in diverse research areas, including hypnotic susceptibility, positive response to psychotherapy, and in developmental research (Fromm et al. 1970; Fishman 1973 and Wulach 1977). Also cited above is evidence for a strong relationship between cognitive flexibility (as seen in performance on the Word Color Interference Test) and readiness of access to primary process (Holt 1960). It is suggested in the present study that greater cognitive flexibility and more adaptive use of primary process should enhance performance on a phonetic symbol task.

The second major area of investigation in the present study relates to the attribute of interpersonal sensitivity, or empathy. This attribute is frequently regarded as an intuitive skill which is essential for the maintenance of effective interpersonal relationships. On a very basic level, such sensitivity can be reflected in a susceptibility for "infection" of the feeling state of another. More sophisticated signs of interpersonal sensitivity can be seen in one's ability to discern the emotional import of facial expression, posture, etc., without being swept into the experience of affect. An attempt to tap both of these predispositions will be made. Primitive or contagious interpersonal sensitivity will be measured using an empathy inventory

designed by Mehrabian and Epstein (1972). Sophisticated interpersonal sensitivity will be evaluated using an adaptation of research materials taken from the work of Ekman and Friesen (1975). The latter investigators discovered robust cross-cultural consistency in the decoding of emotional content in human facial expression.

The experimental hypotheses are as follows: 1) high intuition/perception (as assessed by the MBTI) will show significant, positive correlation with phonetic symbol performance; 2) performance on the Mooney visual gestalt task will be significantly related to phonetic symbol test scores; 3) adaptive primary process on the Rorschach Inkblot Test will show significant and positive correlation with apprehension of phonetic symbols; 4) high interpersonal sensitivity and empathy will be associated with skill in decoding phonetic symbols; 5) the correlation between the percentage of total correct phonetic symbol responses registering in the right hemisphere and the total number of correct responses will be significant and positive.

CHAPTER II

METHOD

Subjects

An initial subject pool consisted of 383 undergraduate psychology students (126 male and 257 female) at the University of North Dakota. This group was administered the Intuition-Sensation and Judgment-Perception scales of the Myers-Briggs Type Indicator (MBTI). All of these subjects were right-handed. The Judgment-Perception dimension of the MBTI does not correspond with any of the original Jungian typological theoretical notions; nonetheless, studies have consistently found significant correlations between this scale and the Intuition-Sensation scale; the latter scale was designed to discriminate persons who consult their inner motivations from persons who utilize sensation as a means to arrive at life decisions (Carlyn 1977). Because of the moderately high relationship between these two scales, which ranges as high as .50 in some studies, it was decided to use them in concert to identify individuals high and low on a composite intuition/perception attribute. Persons were defined as high intuitors if they achieved scores greater than one standard deviation above the mean on the Intuition-Sensation subscale; similarly, persons achieving scores lower than one standard below the mean were defined as low intuitors. To be included in the experiment, high intuitors were also required to obtain a Perception-Judgment score above the mean (i.e., in the direction of

perception); low intuitors were required to score below the mean. There were 84 persons (34 males and 50 females) so selected who agreed to continue participation in the study.

Procedure

Preliminary Session. Subjects were screened a second time using a modification of Mooney's (1957) gestalt closure task. A booklet containing 24 of Mooney's original test items was prepared and distributed to each subject. These test items are human faces which are difficult to discern because they are shown in ambiguous figure-ground relationship. A test answer sheet accompanied the faces booklet, and test instructions required the subject to identify each face by sex, age (child, adult or aged person) and direction facing. Subjects were given 13 minutes to complete this task (see Appendices A and B).

Following completion of the Mooney task, subjects received another booklet containing human face stimulus items. In this instance, however, each face was a distinct photograph rather than an ambiguous figure-ground image. The 60 photographs were designed by Ekman and Friesen (1975) to portray emotions of various kinds and in varying degrees of subtlety. For each picture the subject was asked to select a best choice for a matching emotion from four alternatives. Ekman's standards were adopted for norms (see Appendices C and D). No time limit was set for the Ekman task.

A third piece of data was collected from subjects at this time in the form of an emotional empathy scale designed by Mehrabian and Epstein (1972). This is an inventory of 33 items which attempts to measure a person's capacity for affective appreciation of another's

feelings. Each item is set on an eight point scale, and the direction of low-to-high score is randomly reversed throughout (see Appendix E).

The second experimental screening session ended as subjects returned their completed forms for the three tasks described above. Persons already having been designated as "high" on the MBTI were retained in the study if they achieved a score greater than +.5 standard deviation on the Mooney faces task. In addition, those already having been designated as "low" on the MBTI were retained if they scored below -.5 standard deviation on the Mooney task. Twenty-four subjects meeting these criteria agreed to continue into the final phase of the study. Of the female subjects, five received high scores on both the MBTI and the Mooney, while eight received low scores on both tasks. For males, eight were high on both measures, and three were low on both.

Final Session--Part A. Each person was called back for individual testing for the final phase of the experiment. During the first part of this session subjects were administered an abbreviated version of the Rorschach Inkblot Test, which contained cards II, III, IV, VI and VIII. These cards were chosen because it was felt that they would have high potential to dislodge primary process thought. Half protocols were used in order to avoid obtaining an unwieldy amount of data from the more verbal subjects. It was felt that this modification would permit expedient and efficient collection of data without seriously damaging the validity of the procedure within the confines of the experiment.

The generally accepted method of Rorschach test administration was employed in this experiment. The examiner and the subject were seated side-by-side, and every effort was made to minimize the influence of

the examiner on the subject's responses to each blot. The subject was asked to give free association to each card in turn and then to clarify each of his initial responses in an inquiry directed by the examiner; this is fairly standard procedure.

A slight innovation was introduced by Holt (1970) for the purpose of eliciting additional affective expression from subjects. This consisted simply of asking the subject at the close of each inquiry whether the percept was pleasant or unpleasant. Holt's method of gauging primary process in Rorschach responses involved a two-part process of analysis which considers both the demand for defense (DD) of the response and the effectiveness of the defense (DE). Demand for defense is a rough measure of the shock value of the response or the degree to which the underlying idea requires some defensive activity to make the response socially acceptable. In other words, the libidinal or aggressive content of the response is sufficiently blunt that it would need a contextual reframing to reduce the shock value. An example of such a reframing might be the transformation of the sentence, "It looks like male genitals sticking out in front" to the form, "Sort of like a classical statue of one of the Greek gods; there are his muscular legs, his genitals." Defense effectiveness is a measure of the success with which the subject limits the instinctual impact of a response by channeling it into a socially acceptable expression. The DE score is affected by the basic form level, the expressed affect (inappropriately positive or negative) and other systematized measures of control and defense. A summated product score, $\Sigma(DD \times DE)$, gives a general index of the adaptiveness of a particular subject's use of primary process material. It will be immediately apparent that medium range product

scores could result from either DD or DE being high and the other member being low.

Holt proposed to alleviate this ambiguity by dividing the summated product score, Σ(DD x DE), by the total number of responses containing primary process material (abbreviated as #PPR). The resulting expression, Σ(DD x DE)/#PPR, came to be known as the adaptive regression score and was used as the measure of mature and creative access to instinctual cognitive contents. Subsequently, other forms of adaptive regression scores have been suggested, and each one has stressed a slightly different aspect of the Rorschach data. For example, some researchers prefer to use a quotient involving the percentage, rather than the number, of primary process responses, believing that the original quotient would underrepresent persons generating short records and overrepresent very talkative individuals. Here the resulting expression is Σ(DD x DE)/%PPR. A third adaptive regression quotient relates the summated product to the total value of primary process in a protocol. (Holt's system assigns a PPR value to each response ranging from zero to five.) The resulting expression in this case is Σ(DD x DE)/TPPR. Finally, a fourth quotient score has been proposed which relates the summed product to the quotient of #PPR/%PPR; the expression, Σ(DD x DE)/#PPR ÷ %PPR, is yet another attempt to correct for the fluency of a protocol.

The last adaptive regression measure used in this study is a composite score suggested by Goldberger (Holt 1970). It was proposed as a means to emphasize the relative contributions of DD and DE within the experimental sample. The steps to derive the score are as follows: 1) Rank all subjects from high to low according to percent primary

process (%PPR) in a protocol, assigning the highest percentage a rank of one; 2) rank all subjects from high to low according to the effectiveness of defense (DE) in the total protocol, assigning the protocol with the highest proportion of DE a rank of one; 3) split each of these rankings in half. Identify subjects who fall in the upper halves of both distributions (%PPR and DE), and label these subjects "mature," assigning them a composite score of four. Subjects falling in the lower half of the %PPR distribution but in the upper half of the DE distribution are labelled "rigid but with good control"; they are assigned a composite score of three. People low on both %PPR and DE are labelled "rigid but with breakthroughs" and are given a score of two. Those who are in the upper half of the distribution on %PPR but in the lower half of the DE distribution are designated "poorly controlled" and are given a score of one.

In the interests of clarity and simplicity, the five adaptive regression measures described above will be relabelled to spare the reader confusion in interpreting the results. The chief concern with respect to the Rorschach indices is to appreciate the distinction between scores indicating nonspecific primary process (e.g. #PPR, %PPR) and scores indicating adaptive primary process. The following labels will be assigned to the adaptive primary process measures just described:

Ad. Reg. 1 will refer to the score, Σ(DD x DE)/#PPR;

Ad. Reg. 2 will refer to the score, Σ(DD x DE)/%PPR;

Ad. Reg. 3 will refer to the score, Σ(DD x DE)/TPPR;

Ad. Reg. 4 will refer to the score, Σ(DD x DE)/#PPR $\div$ %PPR;

Ad. Reg. 5 will be the label of Goldberger's composite ranking.

This simplification will permit the reader to identify immediately correlates associated with mature and successful use of primary process.

All of the above indices were subsequently determined by two independent raters using Holt's 1970 manual. Inter-rater agreement was high and is reported in the Results chapter of this dissertation.

Final Session-Part B. Following administration of the Rorschach Inkblot Test, subjects were invited to the room containing experimental apparatus for the final phase of data collection. Subjects were seated before a Gerbrands T-2B-1C tachistoscope, and a set of instructions were read explaining the experimental task (see Appendix F). Briefly, subjects were told that they should associate color meanings to pronounceable nonwords which would be flashed on the right or left half of the viewing field of the tachistoscope. They were asked to limit their color associations to three options: red, green or blue. They were reminded at regular intervals to consider only these choices in the performance of the exercise, and each reminder varied the order of the three choices (blue, green, red; red, blue, green, etc.).

The nonword stimulus items were those used by Langer and his associates in their extensive research on phonetic symbolism (see Introduction). Appendix G is a listing of these stimulus items. Langer's norms were accepted to determine expected high frequencies of association for various stimulus items. Only those items which were shown to be strong associates to the colors red, green or blue were used as test items; these are designated in Appendix G. Thus, for example, a subject's response, "red," to the appearance of ZAH on the tachistoscope screen constituted a correct phonetic symbol match. The balance of the items formed an imbedding medium for the target test

items, in that Langer's research suggests no strong preference for color association for any of these remaining sound complexes. Hence, there were 14 target items randomly intermixed among 11 unscored, non-target items. The order of appearance in the left or right visual field was determined by a table of random numbers, and this order was then reversed in order to give equal visual field exposure to all stimulus materials. Thus there were 28 scored items for each subject, 14 on the right and 14 on the left.

As Appendix F indicates, subjects were instructed to prepare themselves for each stimulus exposure by fixating gaze on an "x" in the center of a prestimulus field. The experimenter then triggered exposure of the stimulus item for 200 milliseconds. This fairly standard split-field research procedure helps to minimize lateral eye movement and the consequent registration of stimuli in both hemispheres simultaneously.

Subjects responded orally with a color association to each item, and these were recorded by the experimenter. The latency of each response was measured by a millisecond timer which was attached to a voice response time control and a microphone placed before the subject. This latency score was recorded along with the associated color response.

At the close of the color phonetic symbol task described above, subjects were asked to complete a form which contained 12 of the stimulus items which they had just viewed on the tachistoscope. They were asked to recall the color choices they had assigned to each of the phonetic symbol nonwords and to write the color name in the space adjacent to the nonword. In addition, they were asked to rate their

confidence in the correctness of each of their choices on a scale of one to five. A variant of the latter manipulation was used in a study by Koriat (1975), in which a significant relationship was found between a subject's level of confidence in his guess of the meaning of a foreign word and his accuracy in guessing the word. It was felt that this measure might relate to other indices of intuition, or "feeling of knowing," as Koriat called it. Lastly, subjects were directed to indicate on their form the foreign languages they had studied (or spoken) and the total number of years of exposure to each language. No hypothesis was offered regarding the possible facilitation such foreign language usage might have on phonetic symbol decoding.

CHAPTER III

RESULTS

A total of 383 subjects were administered the Intuition-Sensation and Judgment-Perception subscales of the MBTI. The following parameters were obtained from the MBTI data: mean = 95.52, standard deviation = 24.84, range = 37-151.

Eighty-four people (34 males and 50 females) were selected for inclusion in the second round of experimental screening. The criterion for continuation in the study was the achievement of an MBTI Intuition score which fell either above plus one standard deviation or below minus one standard deviation; an additional inclusion criterion required the subject's Perception score to fall above or below the mean in the same direction as the intuition score.

It was thought potentially useful to observe changes or consistencies in patterns of correlations when a more extreme separation between high and low intuiting subjects is applied. For this reason, two levels of observation using the intuition screening criterion are reported in Tables 2a and b and 3a and b. At the more stringent level of separation, high intuiting subjects received MBTI intuition scores greater than plus 1.75 standard deviations, and low intuiting subjects scored below minus 1.75 standard deviations.

During the second session, the Mooney Faces test, the Ekman Faces test and the Mehrabian Emotional Empathy test were administered. Means

and standard deviations, respectively, are reported as follows: Mooney, 54.08, 5.14; Ekman, 39.32, 4.07; Mehrabian, 184.70, 20.29. Correlations for the MBTI, Mooney, Ekman and Mehrabian data appear in Table 1.

TABLE 1

CORRELATIONS AMONG MBTI, MOONEY, EKMAN AND MEHRABIAN VARIABLES

	MBTI	Mooney	Ekman	Mehrabian
MBTI	1.000			
Mooney	.161	1.000		
Ekman	- .071	.138	1.000	
Mehrabian	- .023	.150	.046	1.000

Following the second session of data collection, the Mooney task was scored and was used to screen subjects for participation in the final phase of the experiment. Persons achieving scores greater than plus .5 standard deviation or less than minus .5 standard deviation were called back for the third and final experimental session.

The final phase of data collection consisted of completion of the abbreviated Rorschach Inkblot Test and participation in the visually lateralized phonetic symbol task. Independent judges scored Rorschach protocols of all 24 continuing subjects, and interrater reliability coefficients for the various indices are reported as follows: Defense Demand (DD), .95; Defense Effectiveness (DE), .90; Number of Primary Process Responses (#PPR), .96; Percentage of Responses Containing Primary Process (%PPR), .95; Total Value of Primary Process (TPPR), .99.

These reliability coefficients compared favorably with those reported in previous studies (McMahon 1964; Bachrach 1968; Allison 1967; Benfari and Calogeras 1968; Oberlander 1967; Rabkin 1971; Heath 1965).

During the phonetic symbol task, subjects' responses were recorded and were subsequently scored and sorted into various phonetic symbol score categories, including 1) the total number of correct phonetic symbol responses, 2) the total correct responses registered in the right hemisphere (i.e., presented to the left visual field), 3) the total correct responses registered in the left hemisphere, and 4) the percentage of the grand total of correct responses which resulted from stimulation of the right hemisphere. In addition to these measures, response latencies were also recorded through the use of a voice activated timer; however, since no discernible pattern of relationship could be noted between correctness of response and latency, the latency data are omitted in this section.

Although no formal hypothesis was made regarding the relationship between sex and skill at decoding phonetic symbols, it was decided to include sex as a variable at the outset rather than to analyze sex differences in a post hoc fashion. Sex was scored female = 1 and male = 0; therefore, female gender is strongly associated with a variable if the correlation is positive and significant, and male gender is indicated if the correlation is negative and significant.

The variable reporting a subject's foreign language experience is included to check for possible enhancement effects resulting from such exposure.

All experimental data were analyzed using the Pearson Corr routine found in the Statistical Package for the Social Sciences (Nie et al.

1975). Tables 2a and b and 3a and b report resulting correlations which either bear directly on the experimental hypotheses or are of interest for other reasons. The discussion which follows treats experimental hypotheses first and then addresses ancillary findings.

TABLE 2a

CORRELATIONS BETWEEN SELECTED VARIABLES AND PHONETIC SYMBOL SCORES USING INCLUSION CRITERION OF > +1 S.D. OR < -1 S.D. ON THE MBTI (N = 24)

Significance Levels Reported in Parentheses (**)

	R Hem Correct	L Hem Correct	% of Total Correct on R Hem	Total Correct
MBTI	.104	-.062	.101	.013
Mooney	.007	-.141	.132	-.082
Ekman	-.023	-.093	.098	-.067
Mehrabian	-.093	.020	-.130	-.033
#PPR	-.277 (.10)	-.192	-.017	-.252
%PPR	-.304 (.08)	-.215	-.078	-.278 (.09)
Ad. Reg.	.265	.274 (.10)	-.015	.295 (.08)
Sex	.130	.294 (.08)	-.252	.245
# Yrs. For. Lang. (N = 22)	.246	.070	.063	.163

It was hypothesized that high intuition/perception scores on the MBTI would be positively and significantly correlated with phonetic

symbol performance. Tables 2a and b show no significant correlation between any of the phonetic symbol scores and the MBTI intuition/perception measure. Therefore, the data fail to support the hypothesized relationship between intuition and access to phonetic symbols.

TABLE 2b

CORRELATIONS BETWEEN SELECTED VARIABLES AND PHONETIC SYMBOL SCORES USING INCLUSION CRITERION OF > +1.75 S.D. OR < -1.75 S.D. ON THE MBTI (N = 15)

Significance Levels Reported in Parentheses (.**)

	R Hem Correct	L Hem Correct	% of Total Correct on R Hem	Total Correct
MBIT	.091	-.052	.048	.012
Mooney	-.114	-.104	-.058	-.121
Ekman	-.035	-.089	.055	-.073
Mehrabian	.635 (.01)	.367 (.09)	.026	.540 (.02)
#PPR	-.298	-.190	-.076	-.265
%PPR	-.087	-.144	.021	-.133
Ad. Reg. 4	.057	.278	-.150	.203
Sex	.463 (.04)	.542 (.02)	-.286	.616 (.01)
# Yrs. For. Lang.	.279	.079	.054	.185

A second experimental hypothesis predicted a significant relationship between performance on the Mooney visual gestalt task and skill in decoding the color phonetic symbols. Again, the data fail to support this hypothesized relationship. Tables 2a and b reveal that none of

TABLE 3a

INTERCORRELATIONS AND SIGNIFICANCE LEVELS OF PHONETIC SYMBOL SCORES USING INCLUSION CRITERION OF > +1 S.D. OR < -1 S.D. ON THE MBTI (N = 24)

Significance Levels Reported in Parentheses (.**)

	R Hem Correct	L Hem Correct	% of Total Correct on R Hem	Total Correct
R Hem Correct	1.000			
L Hem Correct	.666 (.00)	1.000		
% of Total Correct on R Hem	.082	-.659 (.00)	1.000	
Total Correct	.891 (.00)	.932 (.00)	-.360 (.04)	1.000

TABLE 3b

INTERCORRELATIONS AND SIGNIFICANCE LEVELS OF PHONETIC SYMBOL SCORES USING INCLUSION CRITERION OF > +1.75 S.D. OR < -1.75 S.D. ON THE MBTI (N = 15)

Significance Levels Reported in Parentheses (.**)

	R Hem Correct	L Hem Correct	% of Total Correct on R Hem	Total Correct
R Hem Correct	1.000			
L Hem Correct	.595 (.01)	1.000		
% of Total Correct on R Hem	.060	-.741 (.001)	1.000	
Total Correct	.862 (.00)	.921 (.00)	-.438 (.05)	1.000

the four phonetic symbol scores attain significant correlation with the Mooney task.

The hypothesized correlation between interpersonal sensitivity and skill in accessing phonetic symbols was supported in part. Interestingly, Table 2b reveals that, at the more stringent MBTI level, the Mehrabian emotional empathy scale is significantly correlated with the total number of correct items occurring with stimulation of the right hemisphere. In addition, the correlation between the Mehrabian and the number correct with left hemisphere stimulation reached the level of trend significance. The Ekman faces task, which provided another gauge of interpersonal sensitivity, did not show significant relationship with any of the phonetic symbol measures. It will be recalled that the Mehrabian was used as an operationally defined index of empathy that is primitive and "infectious"; whereas the Ekman was used to measure skill in accurate but detached emotional appreciation. To the extent that this distinction is valid, one might speculate that primitive empathic processes are more akin to the apprehension of phonetic universals than are detached empathic processes.

The hypothesized relationship between Rorschach adaptive regression and phonetic symbol skill did not reach significance, but several trends toward significance were noted in the data. For example, it will be noted that a negative correlation was found between uncontrolled primary process (i.e. #PPR and %PPR) and several phonetic symbol scores, suggesting a deficit in phonetic symbol apprehension under conditions of randomly expressed primary process. More to the point, the correlations between the Ad. Reg. 4 score and the Total Correct and Left Hemisphere Correct scores are positive as hypothesized; however,

the result showing a stronger relationship between adaptive regression and left hemisphere response than between adaptive regression and right hemisphere score is counter to the original hypothesis.

The hypothesis concerning laterality is addressed more directly in an inspection of Tables 3a and b. It was predicted that the correlation between percent of total correct responses channeled to the right hemisphere and the total number of correct responses would be significant and positive. As can be seen in Tables 3a and b, the opposite result was obtained; the correlation between these two variables is significant and negative. In addition, it is of relevance to note that a very high negative correlation was found between the percentage of total correct responses on the right and the number of correct on the left hemisphere; this should be seen in comparison with a lack of correlation between the number of correct responses on the right and the percent of total correct responses on the right hemisphere. Taken together, these findings would tend to implicate left hemisphere superiority in the decoding of phonetic symbol stimuli.

Although no hypotheses were offered regarding sex differences in the apprehension of phonetic symbols, the data reveal a significant correlation between female gender and phonetic symbol access. This relationship was particularly strong at the more stringent level of MBTI separation (Table 2b) and was manifested in correlations involving both hemispheres and the total number of correct responses. Perhaps this finding is a reflection of generally accepted sex differences in verbal ability which favor females (Maccoby and Jacklin 1974). This possibility is discussed in more detail in the next section.

The measure reporting each subject's years of exposure to a

foreign language failed to achieve significance. This variable was included to check for a possible enhancement effect resulting from having studied one or more foreign languages. Such enhancement does not appear to occur in the present study.

Summary of Results

Hypotheses relating intuition and gestalt closure skill to phonetic symbolism were not supported by the data. However, partial support was obtained for the predicted relationship between interpersonal sensitivity and phonetic symbol skill. While no significant correlations between Rorschach adaptive regression and phonetic symbolism scores were obtained, trends toward significance were noted in several instances. With respect to the hypothesized role of the right hemisphere in phonetic symbol decoding, the present results tend to contradict this hypothesis and implicate the left hemisphere. An unanticipated but highly significant relationship between female gender and phonetic symbol access was noted.

CHAPTER IV

DISCUSSION

Findings Related to Hypotheses

From the outset the general hypothesis of this study has been that one's access to phonetic universals is enhanced by an ability to tap primitive, instinctual human cognition. In line with this assumption a variety of theoretical perspectives and strategies were employed to test the correlation between phonetic symbol skill and primitive cognition. One approach utilized the Jungian typological distinction between intuition and sensation, claiming that high intuition should correlate with ability to appreciate latent meaning in the phoneme. This particular hypothesis was not supported by the data.

Another research strategy examined the possibility of differential cerebral hemisphere processing of phonetic symbols. Although the experimental literature gives overwhelming evidence for left hemisphere superiority (in right-handers) for the performance of most language tasks, there is a body of research to suggest that the right hemisphere has a role in interpreting linguistic affect, metaphore and context (Filskov and Boll 1981; Gardner and Denes 1973). Therefore, it was hypothesized that the spatial/contextual/metaphorical cognitive propensities of the right hemisphere would more readily grasp semantic a priori in the phonemes of human speech. This hypothesis was tested in two ways. One technique employed a visual gestalt closure task which

had previously been used to diagnose right hemisphere damage. It was argued that superior performance on this task should imply excellent right hemisphere cognitive function. Although subjects in the present study showed a range of performance on the gestalt closure (Mooney) task, no significant correlation was found between visual gestalt performance and phonetic symbol decoding skill.

The other method used to examine right hemisphere phonetic symbol facility involved comparison of performance by visual field. It was predicted that phonetic symbol stimuli presented to the right hemisphere (via the left visual field) would be more readily decoded than stimuli presented to the left hemisphere. Consequently, it was hypothesized that the correlation between the number of total correct responses and the percentage of total correct responses registering in the right hemisphere would be significant and positive. The result that was obtained showed a significant and negative correlation between these variables. This result disconfirms the original hypothesis and also implicates the left hemisphere as the primary agent for decoding phonetic symbol stimuli.

Recent research on right hemisphere language may offer partial explanation for the result contrary to hypothesis. Zaidel and Peters (1981) discovered that commissurotomized subjects were able to use their right hemispheres to match pictures of things with homonymous names (e.g., flying bat and baseball bat) and also pictures of things with names that rhyme. However, these patients were unable to use their right hemispheres to name any of the items by pointing to the appropriate name in print. In another experiment reported in the same article, Zaidel and Peters presented nonlinguistic printed words similar to

those used in this dissertation and asked their commissurotomized subjects to match those "words" which rhymed; again, the investigators restricted input to the right hemisphere. The subjects were unable to perform above chance level. Zaidel and Peters concluded that the right hemisphere is able to read ideographically, recognizing words directly without any intermediate phonetic recoding. Such ideographic reading is thought to be dependent on prior familiarity with the test words, which permits processing as a whole template and does not require the translation of grapheme to phoneme. Perhaps such translation is entirely out of the realm of the right hemisphere by virtue of the sequential nature of the task of reading unfamiliar words; linear and sequential processing are more typically associated with the left hemisphere. In light of the findings obtained in the study cited above and in previous work by the same authors (Peters and Zaidel 1980; Zaidel 1978), it would seem improbable for the visual mode to permit right hemisphere processing of phonetic symbols. It will be recalled that a visual half-field design was chosen to assure complete crossover of stimulus material at the optic chiasm. This was hoped to be an improvement over a monaural stimulus presentation which had been used successfully in a study of the primitive latent meanings of common English words (Adair 1974). Although one achieves only 60 percent neural crossover using the monaural technique, it might be a preferable method of differential presentation of phonetic symbols, since it is free from the processing limitations inherent in printed material. Future research on the relationship between laterality and phonetic universals should consider carefully the issue of channel of presentation.

In addition to the experimental treatments relating to intuition and laterality, a third approach to the examination of instinctual cognition was pursued through use of the Rorschach Inkblot Test. This investigation used Holt's (1970) manual, which provides a method for distinguishing between adaptive and uncontrolled regression. The results generated by this manipulation did not reach significance, but they did reveal a pattern of trends consistent with theoretical expectation. Specifically, heightened expression of "raw" or uncontrolled primary process correlated with resistance to the apprehension of phonetic symbols; whereas, high levels of adaptive regression correlated with enhanced phonetic symbol performance. This is in keeping with the interpretation that mature use of primary process implies ease in providing structure for perceptual stimuli and also in accessing semantic a priori.

When the Rorschach is used as a research tool in this fashion it ceases to be a clinical instrument and becomes instead a means to measure skill in perceptual synthesis. In this role it is seen as having the potential to delineate deep cognitive structure that is actively constructed by the subject through the stimulus of an amorphous form. By supplying his or her own contours and gestalts, the subject achieves a kind of closure with varying degrees of success. It is an open question as to whether these perceptual skills are of the same cloth as those associated with access to linguistic/semantic a priori; the present results are inconclusive ($p = .08$).

The results relating to interpersonal sensitivity would seem to be inconsistent with much of what has been stated concerning the Rorschach data. Although there is a trend suggesting association between

phonetic universals and controlled primary process on the Rorschach, it was the Mehrabian empathy test, which was chosen for its propensity for more primitive and contagious affect, that showed highly significant correlation with phonetic symbol skill. To the extent that this attribute implies a loss of control over one's affect, this would seem to be antithetical to mature, adaptive regression. It is interesting to compare this result with that obtained using the Ekman faces task. The latter test, which was meant to provide an index of one's skill at interpreting emotion in facial expression, did not correlate with phonetic symbolism. In contrast to the Mehrabian, the Ekman test was thought to be a more detached and objective empathic function. Perhaps the Mehrabian captures a substantial portion of the high affective intensity necessary for generating instinct-laden percepts which may or may not be transformed to a socially appropriate expression.

Findings Unrelated to Hypotheses

The most prominent result of the present study does not relate to any of the original hypotheses; rather, it concerns the finding of pronounced sex differences in phonetic symbol skill. Most categories of phonetic symbol skill correlated significantly with female gender.

It is possible to view this result in the context of reported sex differences in verbal ability favoring females. Research literature has tended to support the picture of differential cognitive abilities according to gender. More specifically, it has become generally accepted that males show superiority in the performance of spatial cognitive tasks, while females are superior in verbal tasks (Maccoby and Jacklin 1974; Hutt 1972).

Female advantage on verbal skills appears to be very broad-based and includes areas such as vocabulary usage, grammar, oral expression and punctuation. Enhanced performance relative to males begins in early childhood and continues through high school and possibly beyond (Sherman 1978). It is interesting to note that this enhanced overall verbal skill relative to males has been found among learning disabled as well as normal children (Idol-Maestos 1980). Differences favoring females have been found among Japanese children performing a task requiring the recognition of cursive and ideographic writing (Tanaka 1977). Significant differences favoring females have also been noted among elementary school children on the Stroop Color Word Interference Test (Cohen and Fischer 1980).

It will be recalled that the Stroop test was prominent in Holt's (1960) research on the relationship between cognitive control and adaptive regression. He speculated that greater interference effects on the Stroop resulted from immature cognitive development, which, in turn, produced conflict when the subject was asked to suppress a reading response and produce a color naming response. Conflict was seen as occurring in immature subjects because mastery of the more sophisticated response (i.e., reading) had occurred much more recently than it had in the mature subjects. In addition, these presumably immature subjects had an unexpectedly low frequency of primary process in their Rorschach protocols; however, the experimenter made anecdotal mention of nervous laughter and squirming, suggesting extreme discomfort and suppression of primary process. Perhaps the recent sex difference findings of Cohen and Fischer are indicative of less susceptibility to conflict and greater cognitive flexibility in the

performance of linguistic tasks. In this connection, it is also of relevance to recall that schizophrenics showed markedly poorer performance than normals on both the conventional and the phonetic symbol Stroop tests (Wapner and Krus 1960; Langer, Stein and Rosenberg 1969), suggesting less control over symbolic/cognitive function.

Sex differences have been reported for performance on a standardized clerical test which requires the matching and correction of a list of names and addresses against an original (Andrew and Patterson 1959; Schneidler and Patterson 1942). Females show consistent superiority on this task starting at age five and continuing on through adulthood (Miele 1958). While this task has been described as a measure of perceptual speed (Hyde and Rosenberg 1980), it would seem appropriate in the context of the present study to speculate as to whether the clerical task also taps cognitive/semantic properties of test stimuli which reflect a deep structural predisposition to printed material. Certainly, the high correlation between female gender and phonetic symbol skill obtained in this investigation is consistent with such an interpretation.

The developmental literature revealing very early sex differences in verbal and spatial cognitive skills has raised the question whether these findings reflect actual differences in brain physiology according to gender. From clinical reports on patients suffering from aphasia, it has long been noted that females are more likely to suffer language loss from a rightsided stroke than are males; clinicians also noted that females tended overall to have better prognosis for recovery of language following a stroke (Heilman and Valenstein 1979). These reports led to the suspicion that females are less lateralized for

language function than males. Recent well controlled experiments using dichotic listening and visual split field techniques have supported the notion of bilateral language function in females (Lake and Bryden 1976; McKeever and Jackson 1979). Bradshaw and Gates (1978) go so far as to interpret their results to suggest "that in females right hemisphere space normally reserved for visuospatial processing may have been invaded by secondary speech mechanisms"; these authors claim that the mechanisms they propose are essentially lexical and are used to assist in processing difficult phonological or graphological material. If female neurophysiology does provide extra "space" for semantic and lexical processing of novel material, the present results could conceivably be a product of this advantage.

The possibility that female brain structure might enhance the apprehension of phonetic universals offers new avenues for future research into the general question of semantic invariance. Certainly, planned comparisons of gender performance on phonetic symbol tasks would seem to be indicated in light of present findings. Future research should address some of the speculation raised by Bradshaw and Gates about a special female lexicon apparatus; effort should be made to specify its unique function. Although the present study offers no evidence for right hemisphere phonetic symbol graphological function, Bradshaw and Gates' work would suggest that further exploration of phonetic/orthographic linkage is in order. In this connection, it is apropos to note that researchers in linguistics have found evidence for cross-modal invariance between phonemic and orthographic structure; Koriat and Levy (1977) found that monolingual Hebrew speaking subjects were able to guess the meaning of Hindi characters at a level

significantly above chance. While linguistic research has yet to address the issue of sex differences, cross-modal investigation of semantic invariance has been of prime interest to psycholinguists for decades. Phonetic symbolism research should perhaps be seen as a subset of this larger concern (Osgood, Suci and Tannenbaum 1957).

The findings of the present study showing correlations between female gender and phonetic symbol scores can be described as serendipidy. However, to the extent that these results are consistent with previous research on female linguistic superiority, one is inclined to regard them as supportive of phonetic universals. Stated in negative terms, one would expect to have seen no significant association of gender with phonetic symbol score in the absence of differential phonetic universals access.

Reviewing all of the reported results obtained in the present study, it would seem appropriate to recast some of the theoretical notions which maintained at the outset. Perhaps it is consistent with the data at hand to regard phonetic symbol access as a function of one's ability to impose perceptual and cognitive structure on stimuli that do not have immediate consensual agreement as to meaning. A phoneme, a grapheme or an amorphous pictorial form will call forth a structuring mechanism which does not appear to be connected to the instinctual side of a person but rather seems to be a property of one's cognitive flexibility and sophistication. Such a conceptualization alters the epistemological debate posed in the first section of this paper, in that the issue ceases to concern radical articulations of associationism and nativism but moves instead to an inquiry into the limits of dynamic semantic structuring across modalities.

CHAPTER V

SUMMARY

The preceding investigation examined the phenomenon of phonetic symbolism. Broadly defined, phonetic symbolism is a nativist theoretical construct which holds that inherent meaning exists in the phonemes of human speech. Although the debate between nativist and associationist positions regarding the origin of human speech dates to classical antiquity, actual scientific inquiry began in the 1920's in Germany with the work of Von Hornbostel (1924) and Usnadze (1924). Sapir did the first study in America in 1929, and he was the first to coin the term phonetic symbol in reference to presumed inherently meaningful speech sounds.

Since 1929, American research in this area has taken two different approaches. One research strategy involves the use of monolingual subjects who are asked to guess the meanings of words from an unfamiliar language; the other strategy makes use of unconventional word sounds to which subjects are asked to attribute meanings. The latter research approach was taken in the present study.

Although it has been reliably demonstrated that persons favor certain meaning associations to a given word sound (Kohler 1927, Davis 1961), little work has been done to examine the perceptual or intrapsychic parameters of this skill. Following from nativist theory, it was felt to be a reasonable assumption that the phonetic symbol would

represent an archaic segment in the evolution of language. Consequently, the present study proposed to test the hypothesis that access to phonetic/semantic universals is related to an individual's ability to appreciate his instinctual, primitive motivation. A variety of measures were employed to maximize the distinction between high and low access to instinctual, primary process thought. The results are suggestive of only a marginal association between primary process and phonetic symbol skill; however, primitive interpersonal sensitivity was correlated with phonetic symbolism.

Although unexpected, a strong relationship between female gender and phonetic symbol apprehension was found. This was discussed within the context of previous research demonstrating female superiority on verbal tasks.

APPENDICES

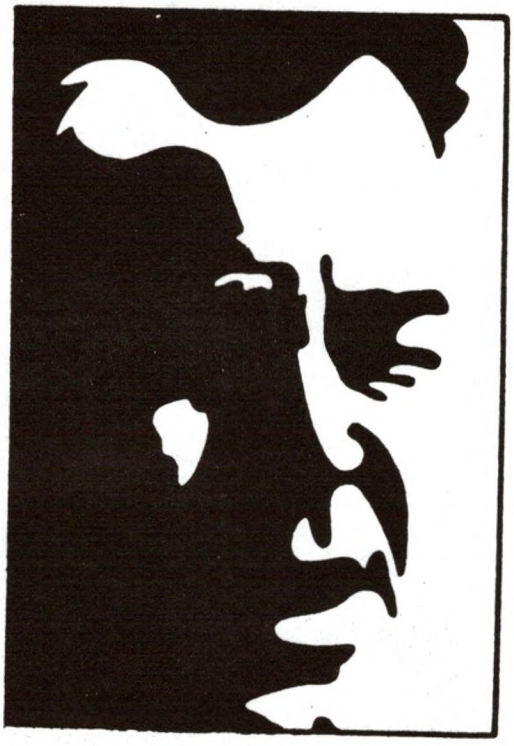
APPENDIX A

MOONEY FACES BOOKLET

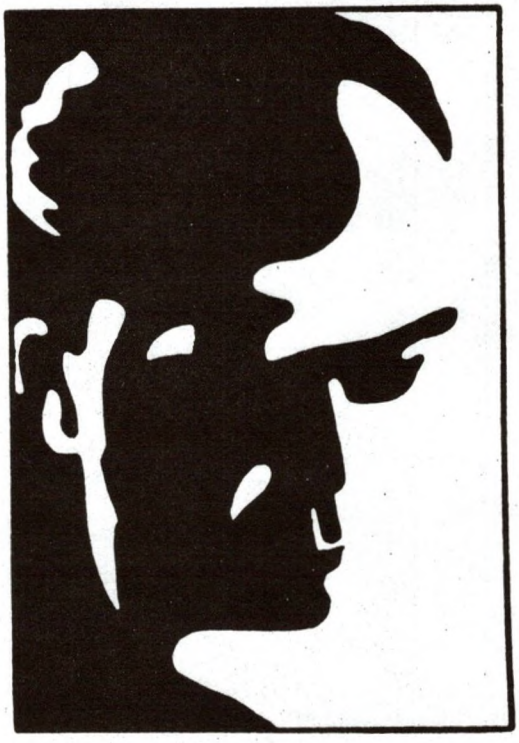
MOONEY FACES BOOKLET

1

2



3



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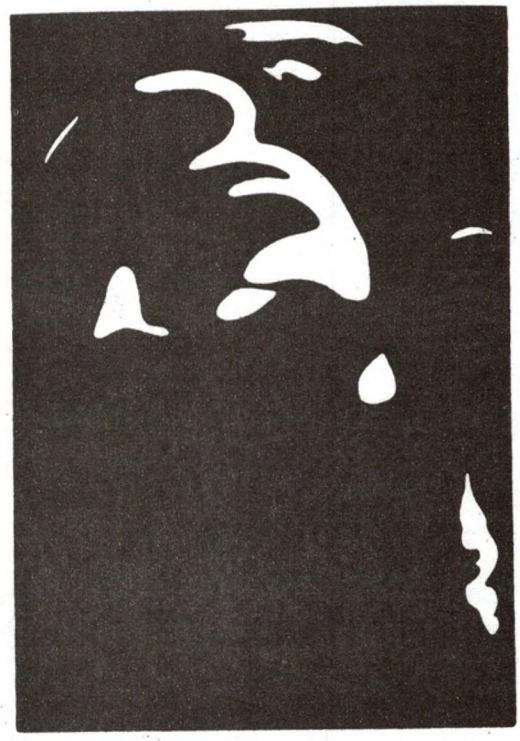

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APPENDIX B

MOONEY FACES ANSWER SHEET

MOONEY FACES ANSWER SHEET

(Correct Response Marked X)

NAME_____

The figures you are about to see are all human faces, and they are all right side up. The numbered items below refer to the numbers of the figures in the accompanying booklet.

Your task is to describe the face by placing an x next to the most correct word in each of the following categories: SEX (Male, Female); AGE (child, adult, aged); and DIRECTION LOOKING (e.g. left, right, up, down, etc.). Rate the direction looking according to your own perspective--your right or left, etc.--and not the perspective of the face in the picture.

If you are unable to see a figure within a few seconds, skip it and return to it later.

1. Sex: __M Age: __child __aged Direction __right __up
   X F X adult Looking: X straight out

2. Sex: X M Age: __child __aged Direction __left X right
   __F X adult Looking: __up

3. Sex: X M Age: __child __aged Direction __down __left
   __F X adult Looking: X right

4. Sex: X M Age: __child __aged Direction X lower right __straight out
   __F X adult Looking: __upper left

5. Sex: X M Age: __child __aged Direction X left __down
   __F X adult Looking: __right

6. Sex: __M Age: X child __aged Direction __down __left
   X F __adult Looking: X right

7. Sex: X M Age: __child __aged Direction X straight out __left
   __F X adult Looking: __up

8. Sex: __M Age: __child X aged Direction __down X right
   X F __adult Looking: __left

9. Sex: __M Age: __child __aged Direction __upper right __lower right
__X F __X adult Looking: __X lower left

10. Sex: __X M Age: __child __aged Direction __up __X right
__F __X adult Looking: __left

11. Sex: __M Age: __child __aged Direction __down __X right
__X F __X adult Looking: __left

12. Sex: __X M Age: __child __aged Direction __right __X down
__F __X adult Looking: __left

13. Sex: __X M Age: __child __aged Direction __X lower left __upper right
__F __X adult Looking: __upper left

14. Sex: __X M Age: __child __aged Direction __up __right
__F __X adult Looking: __X left

15. Sex: __X M Age: __child __aged Direction __right __X straight
__F __X adult Looking: __left out

16. Sex: __M Age: __X child __aged Direction __lower left __X straight
__X F __adult Looking: __lower right out

17. Sex: __M Age: __child __aged Direction __lower right __up
__X F __X adult Looking: __X left

18. Sex: __M Age: __child __aged Direction __X upper right __lower right
__X F __X adult Looking: __lower left

19. Sex: __M Age: __child __aged Direction __upper left __X upper right
__X F __X adult Looking: __lower right

20. Sex: __X M Age: __child __aged Direction __right __down
__F __X adult Looking: __X left

21. Sex: __X M Age: __child __aged Direction __left __X straight
__F __X adult Looking: __up out

22. Sex: __X M Age: __child __aged Direction __X left __right
__F __X adult Looking: __up

23. Sex: __X M Age: __child __aged Direction __down __X left
__F __X adult Looking: __right

24. Sex: __M Age: __child __aged Direction __lower left __upper left
__X F __X adult Looking: __X lower right

APPENDIX C

EKMAN FACES BOOKLET

EKMAN FACES BOOKLET

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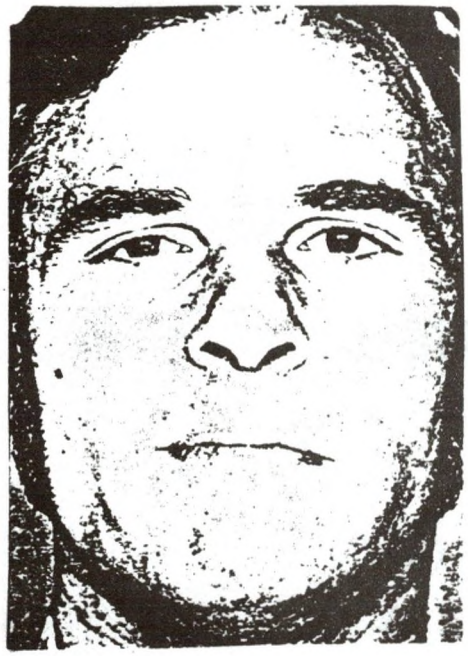

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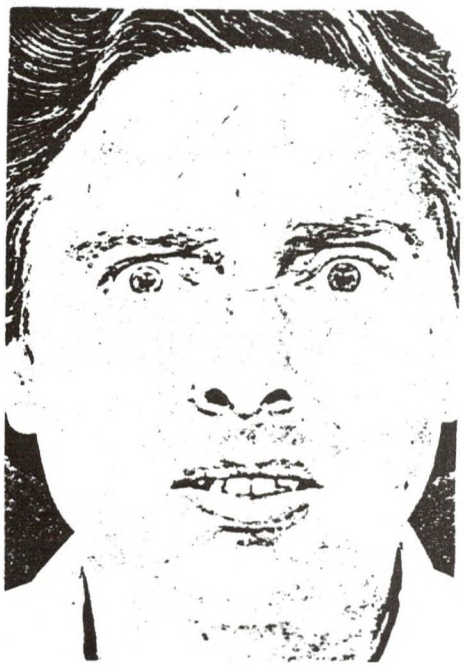

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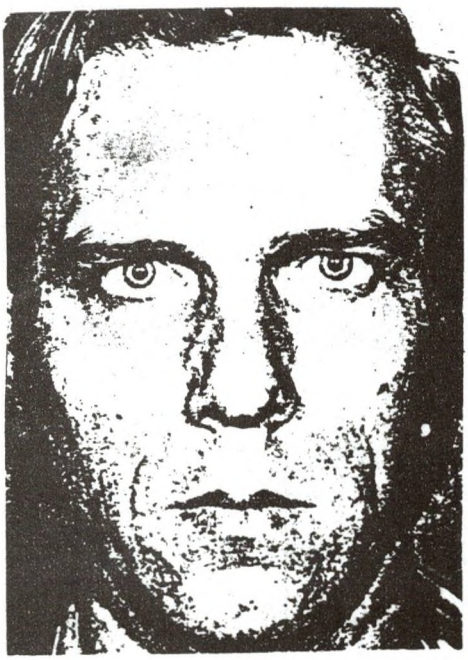

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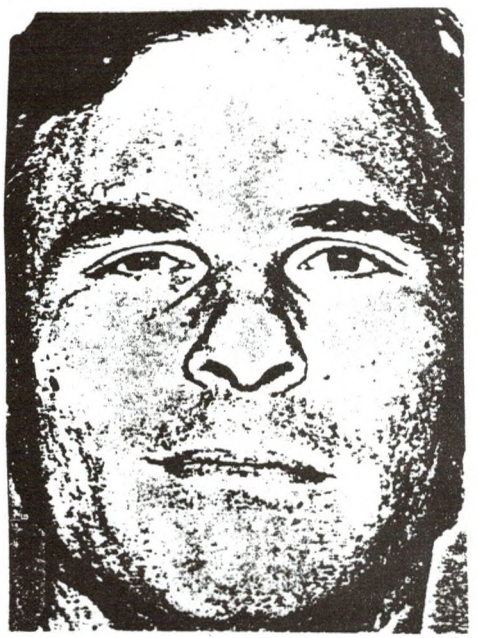

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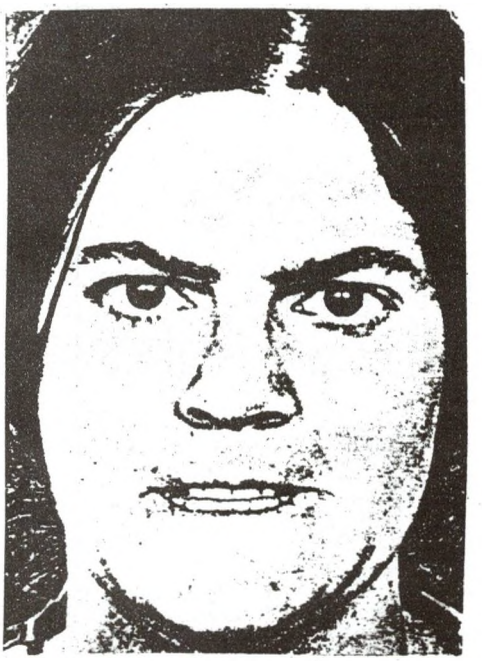

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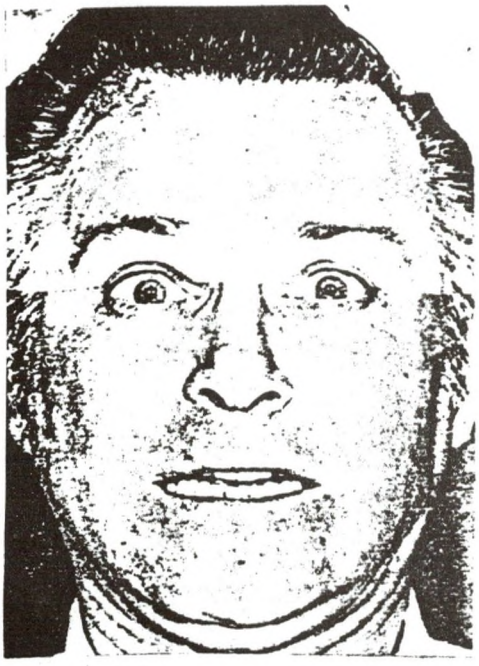

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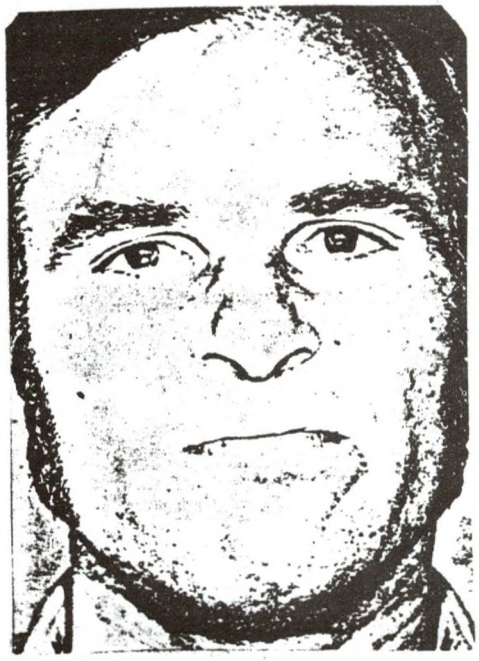

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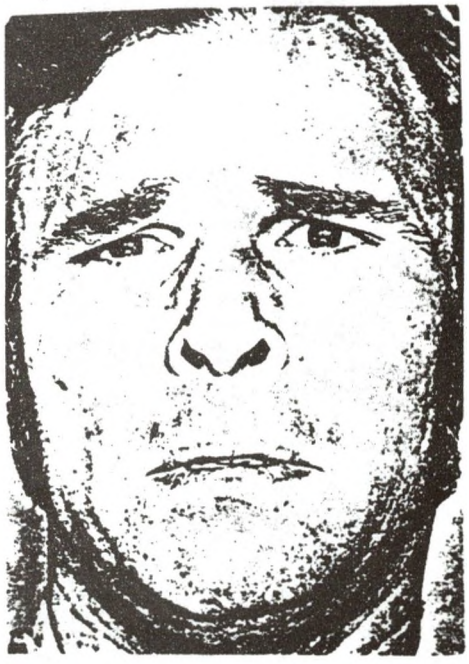

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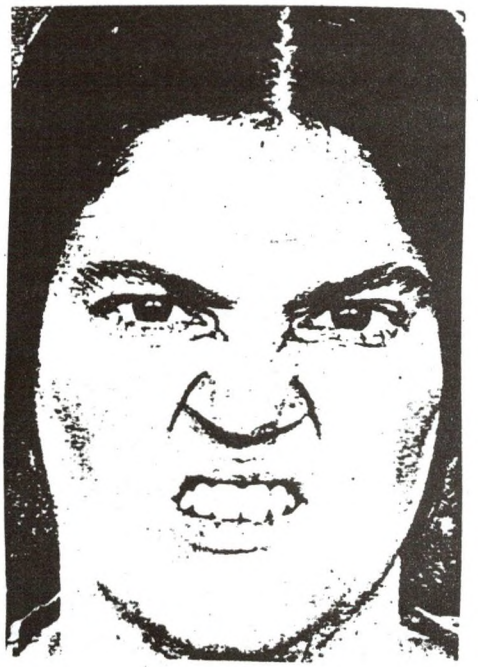

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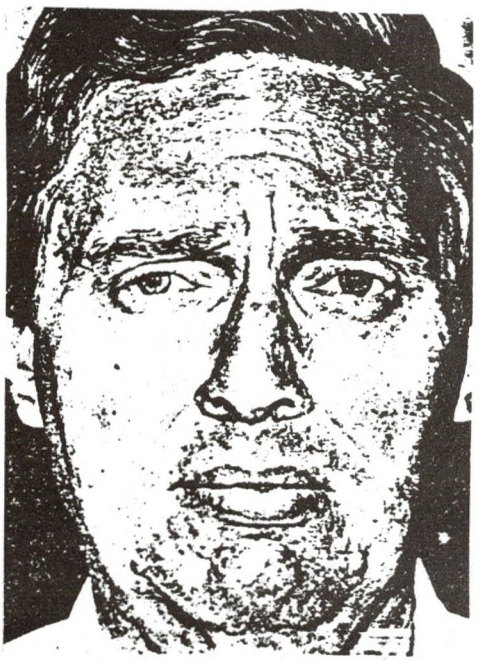

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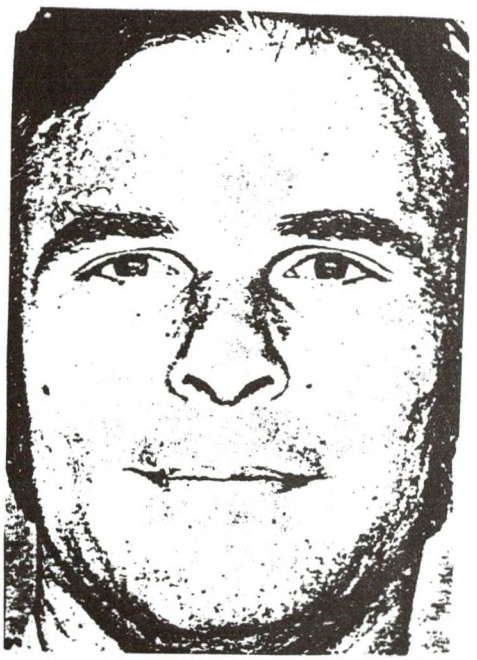

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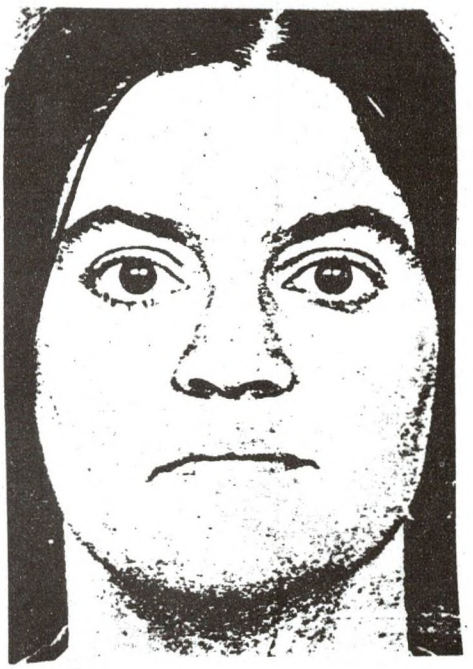

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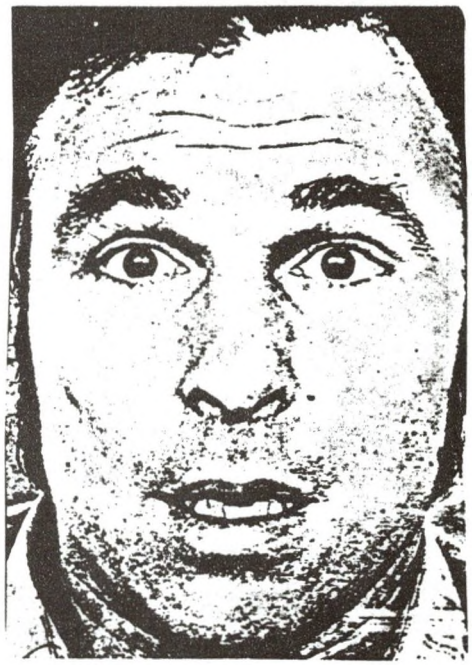

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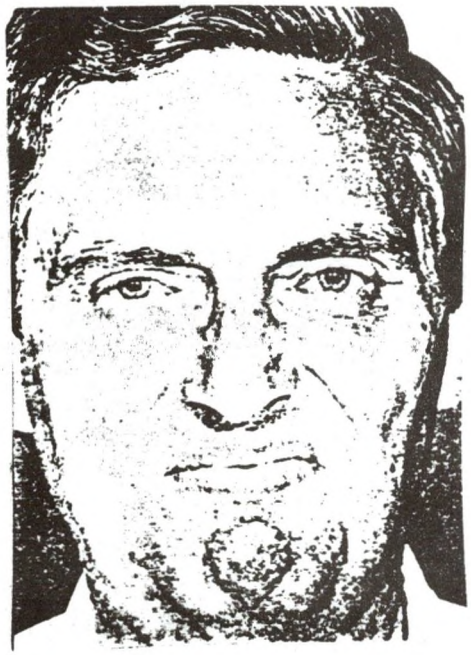

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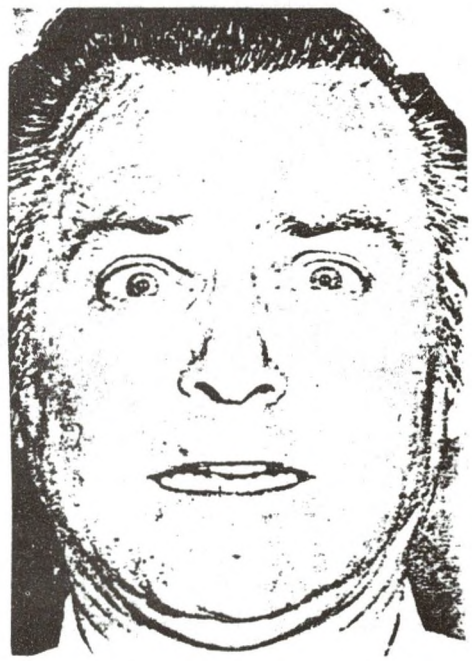

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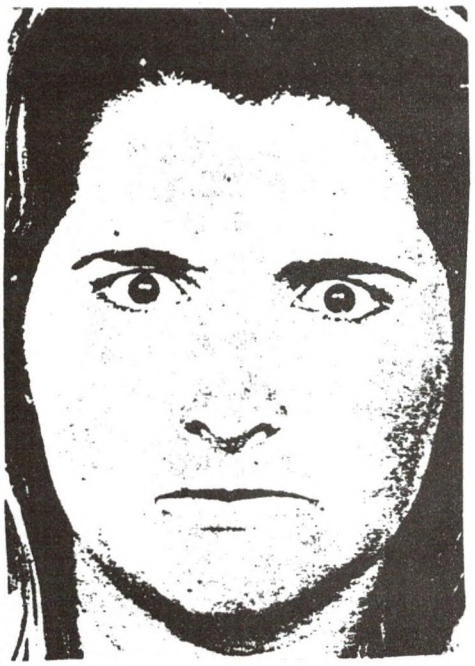

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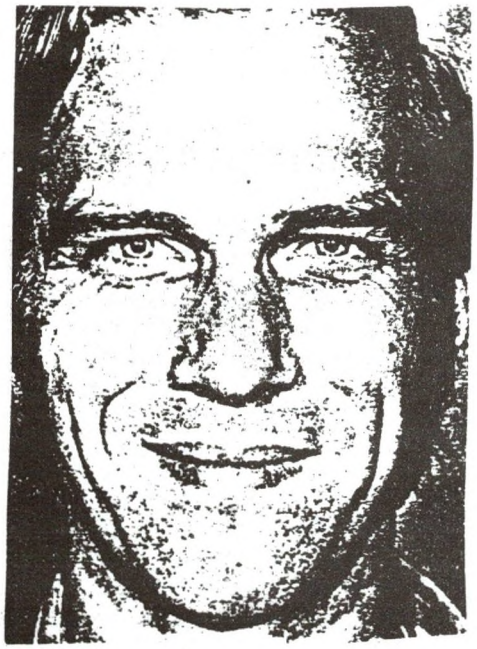

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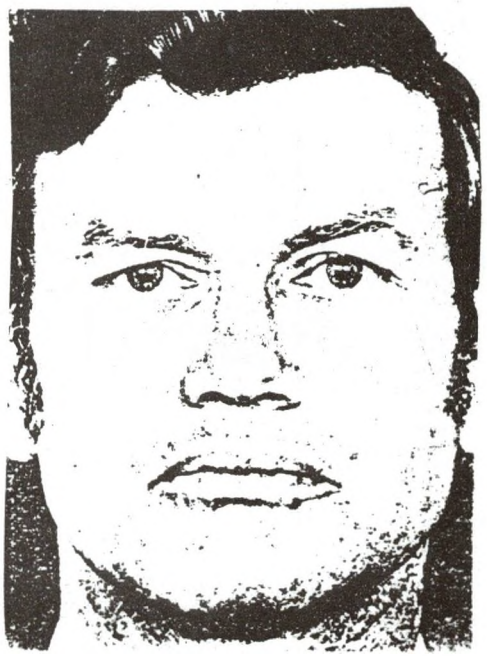

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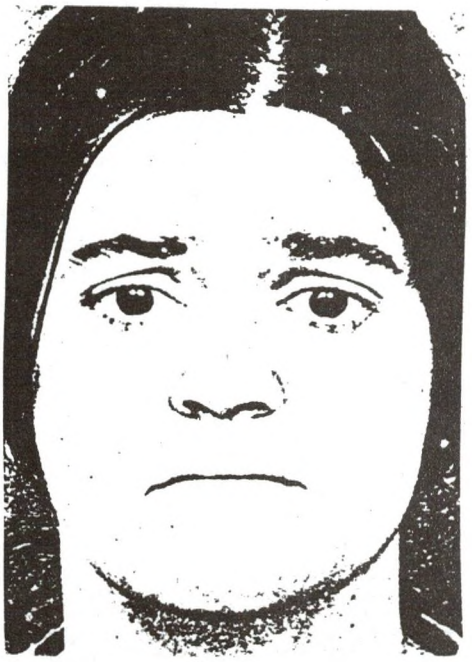

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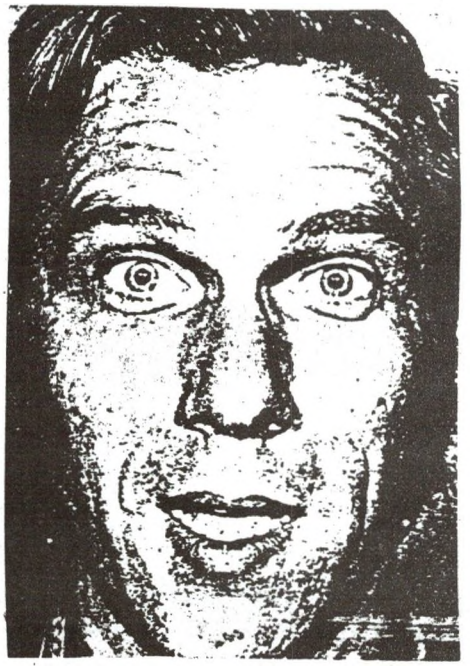

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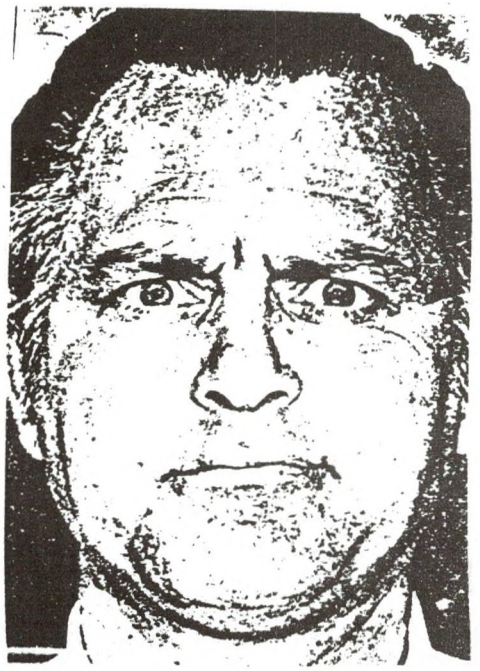

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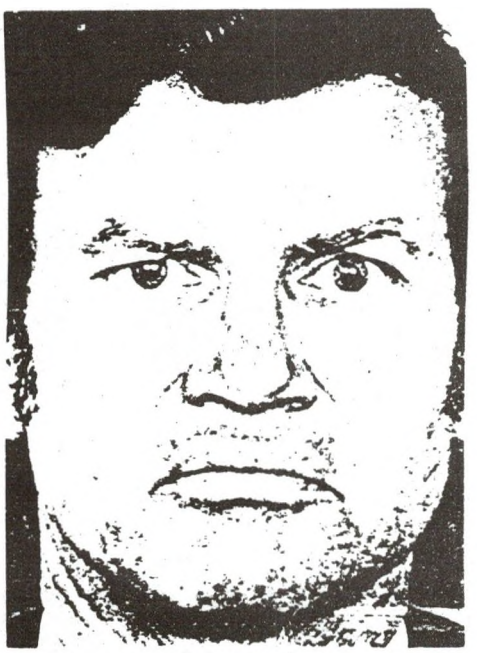

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APPENDIX D

EKMAN FACES ANSWER SHEET

EKMAN FACES ANSWER SHEET

(Correct Response Marked #)

DIRECTIONS:

Each of the numbered items below corresponds to a numbered picture of a human face in the accompanying booklet. The person in each of the pictures is exhibiting a particular emotion or blend of two emotions. For each item, circle the emotion that you think best describes the emotion being exhibited in the picture. Blends are indicated by two emotions with a slash between them (e.g. surprise/anger).

1.	#a. fear	b. surprise	c. sadness	d. happiness
2.	a. surprise	b. disgust	#c. happiness	d. slight happiness
3.	a. neutral	b. happiness	#c. contempt	d. sadness
4.	a. disgust	#b. fear	c. surprise	d. sadness
5.	#a. sadness	b. contempt	c. shock	d. disgust
6.	a. disgust	b. surprise/ anger	c. contempt	#d. anger
7.	a. anger/fear	#b. fear	c. disgust	d. happiness
8.	#a. neutral	b. fear	c. contempt	d. sadness
9.	a. surprise	#b. surprise/ fear	c. surprise/ disgust	d. surprise/ anger
10.	a. disgust	b. neutral	c. anger	#d. sadness
11.	a. happiness	b. neutral	c. contempt	#d. happiness/ contempt
12.	a. sadness	b. anger/ surprise	#c. anger	d. contempt/ anger
13.	#a. surprise/ fear	b. surprise/ anger	c. surprise/ disgust	d. surprise

14.	a. anger	b.	fear	#c.	disgust	d.	contempt
15.	a. disgust	#b.	disgust/ contempt	c.	surprise/ disgust	d.	sadness
16.	#a. sadness	b.	fear	c.	surprise/ fear	d.	happiness
17.	a. contempt	b.	surprise/ disgust	c.	sadness	#d.	disgust
18.	a. anger/ surprise	b.	disgust	#c.	anger/ disgust	d.	surprise/ disgust
19.	#a. sadness	b.	happiness	c.	sadness/ fear	d.	sadness/ contempt
20.	a. surprise/ disgust	b.	anger/ fear	c.	surprise	#d.	anger/ surprise
21.	a. contempt	#b.	happiness	c.	fear	d.	fear/ happiness
22.	a. contempt	b.	disgust	#c.	anger	d.	anger/ sadness
23.	a. fear	b.	contempt	c.	natural	#d.	sadness
24.	#a. disgust/ contempt	b.	sadness/fear	c.	anger/ disgust	d.	surprise
25.	#a. fear	b.	surprise	c.	sadness	d.	horror
26.	a. contempt	#b.	neutral	c.	slight sadness	d.	slight fear
27.	a. surprise/ happiness	b.	surprise/ disgust	#c.	surprise/ fear	d.	surprise/ anger
28.	#a. surprise/ fear	b.	surprise	c.	fear	d.	sadness
29.	a. disgust/ anger	b.	surprise/ anger	c.	surprise	#d.	anger
30.	a. surprise/ happiness	#b.	surprise	c.	surprise/ fear	d.	anger
31.	#a. disgust/ anger	b.	anger	c.	contempt	d.	sadness
32.	a. horror	b.	skepticism	#c.	surprise	d.	fear

33.	a.	happiness	b.	anger/ surprise	#c.	anger	d.	anger/ contempt
34.	a.	disgust	#b.	surprise	c.	surprise/ sadness	d.	fear
35.	#a.	disgust	b.	anger	c.	fear	d.	happiness
36.	a.	contempt	#b.	fear	c.	disgust	d.	fear/ sadness
37.	a.	sadness	#b.	fear	c.	happiness	d.	surprise
38.	a.	surprise	#b.	happiness	c.	disgust	d.	relief
39.	a.	surprise	b.	happiness/ surprise	#c.	fear/ surprise	d.	sadness/ surprise
40.	#a.	anger/ disgust	b.	anger/ sadness	c.	anger/ surprise	d.	anger
41.	a.	contempt	b.	fear	c.	joy	#d.	anger
42.	a.	contempt	b.	relief	#c.	happiness	d.	anger
43.	a.	fear	b.	surprise/ happiness	c.	relief/ happiness	#d.	happiness
44.	a.	anger/ contempt	#b.	anger	c.	anger/ disgust	d.	fury
45.	a.	anger	#b.	happiness	c.	sadness	d.	surprise
46.	a.	anger	b.	happiness	#c.	sadness	d.	fear
47.	#a.	fear	b.	surprise/ fear	c.	sadness/ fear	d.	pleasure
48.	a.	contempt	b.	surprise	c.	happiness	#d.	neutral
49.	a.	happiness	b.	neutral	#c.	sadness	d.	disgust
50.	a.	happiness	#b.	happiness/ surprise	c.	surprise/ fear	d.	contempt
51.	a.	happiness	#b.	fear	c.	anger	d.	neutral
52.	a.	contempt	#b.	disgust	c.	anger	d.	fear
53.	a.	neutral	b.	fear	#c.	surprise	d.	anger
54.	#a.	surprise	b.	fear	c.	surprise/ fear	d.	anger

55.	#a.	surprise/ happiness	b.	neutral	c.	surprise/ fear	d. surprise
56.	#a.	contempt	b.	neutral	c.	sadness	d. fear
57.	a.	anger/ sadness	b.	anger/ fear	#c.	anger/ contempt	d. anger/ happiness
58.	#a.	slight sadness	b.	extreme sadness	c.	slight fear	d. extreme fear
59.	#a.	anger/ disgust	b.	anger	c.	anger/ happiness	d. anger/ surprise
60.	a.	sadness	#b.	sadness/ fear	c.	anger	d. surprise

APPENDIX E

EMOTIONAL EMPATHY SCALE

EMOTIONAL EMPATHY SCALE

(+ Marks Direction of Maximum Score)

NAME_____

DIRECTIONS: Answer each of the following questions by placing an x on the part of the scale which most closely corresponds to your agreement (or disagreement) with that item. The scale has eight segments, ranging from "very strongly agree" to "very strongly disagree."

Example:

A. I like rare roast beef

very strongly agree		x		mildly agree	mildly disagree		very strongly disagree

---

1. It makes me sad to see a lonely stranger in a group.

+	very strongly agree			mildly agree	mildly disagree			very strongly disagree

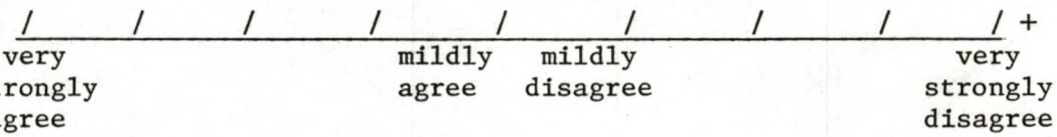
2. People make too much of the feelings and sensitivity of animals.

very strongly agree			mildly agree	mildly disagree			very strongly disagree	+

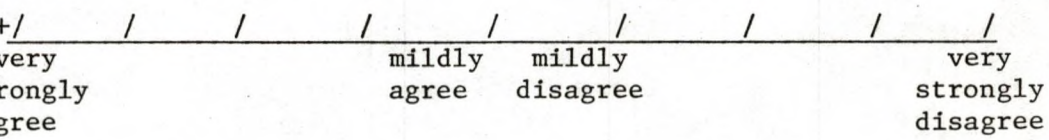
3. I often find public displays of affection annoying.

very strongly agree			mildly agree	mildly disagree			very strongly disagree	+

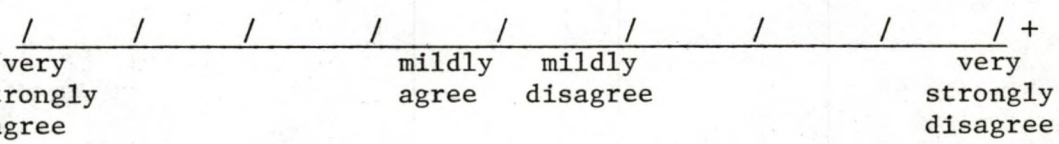
4. I am annoyed by unhappy people who are just sorry for themselves.



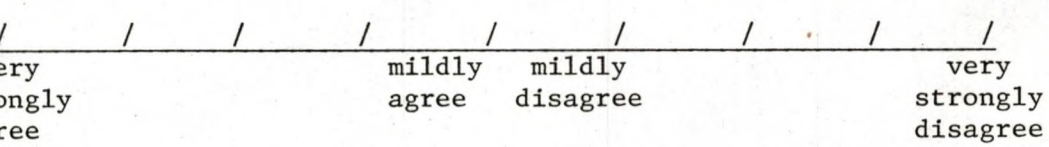
5. I become nervous if others around me seem to be nervous.



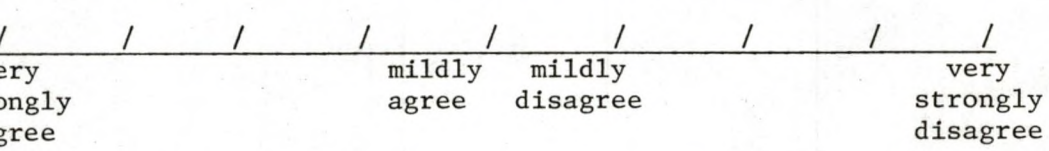
6. I find it silly for people to cry out of happiness.



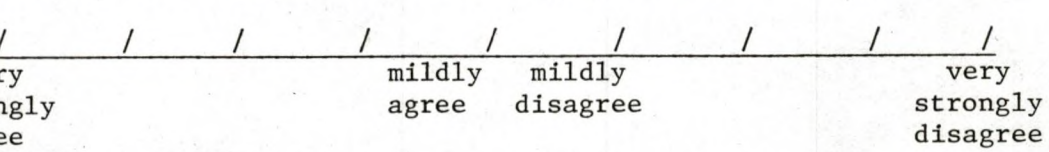
7. I tend to get emotionally involved with a friend's problems.



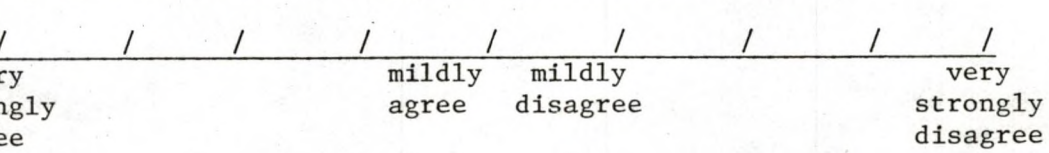
8. Sometimes the words of a love song can move me deeply.



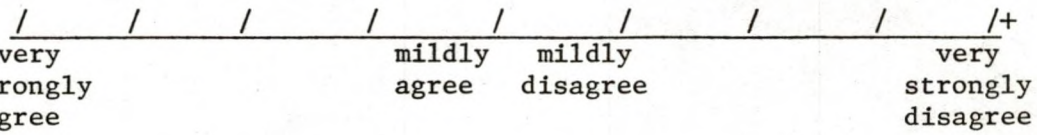
9. I tend to lose control when I am bringing bad news to people.



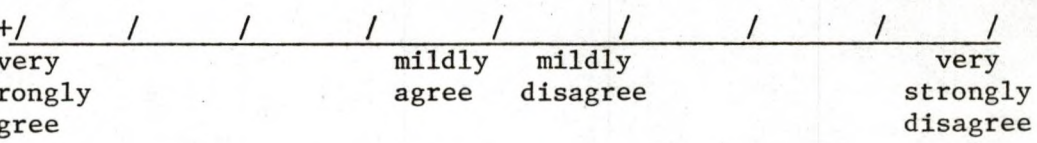
10. The people around me have a great influence on my moods.



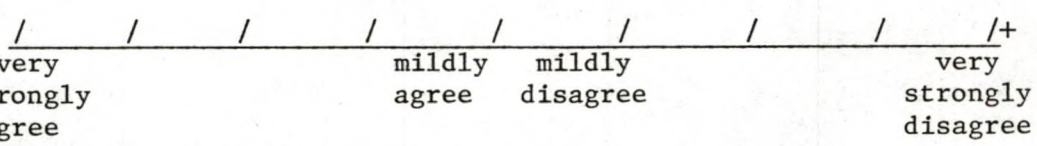
11. Most foreigners I have met seemed cool and unemotional.



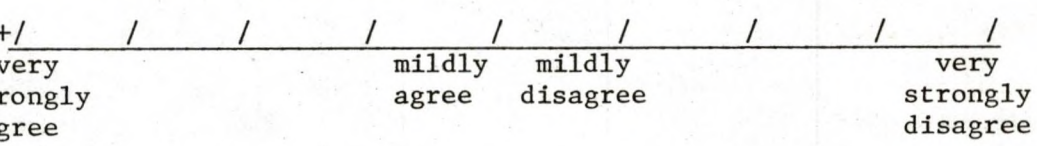
12. I would rather be a social worker than work in a job training center.



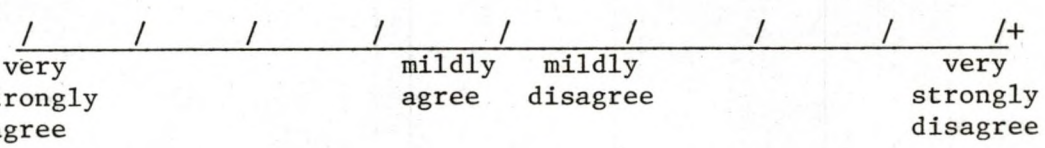
13. I don't get upset just because a friend is acting upset.



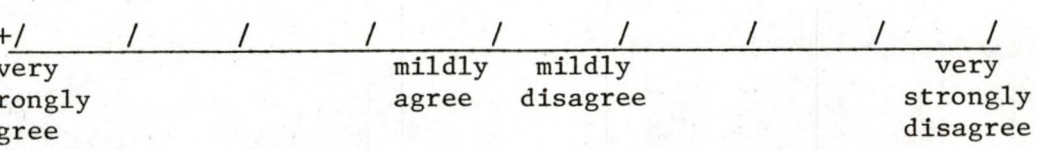
14. I like to watch people open presents.



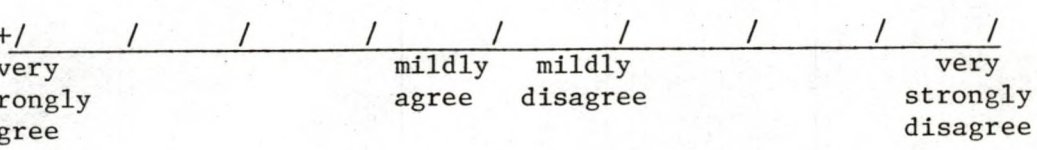
15. Lonely people are probably unfriendly.



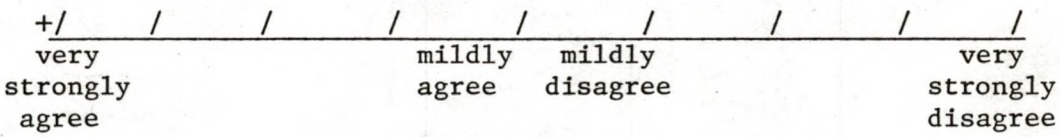
16. Seeing people cry upsets me.



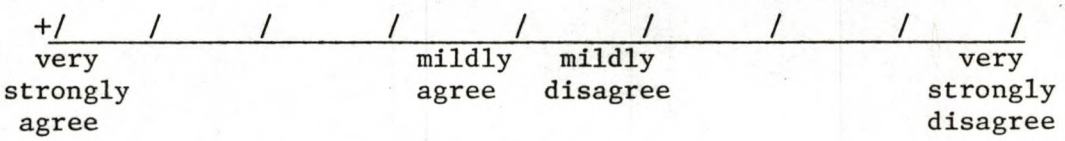
17. Some songs make me happy.



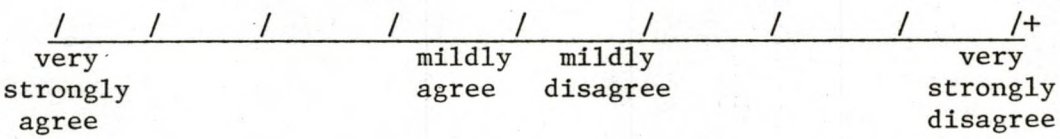
18. I really get involved with the feelings of the characters in a novel.



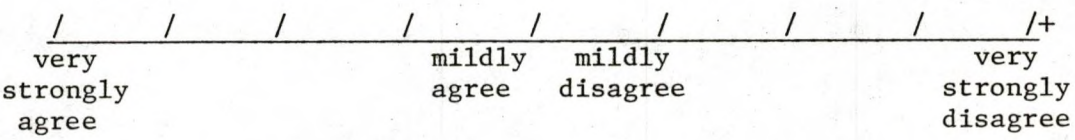
19. I get very angry when I see someone being ill-treated.



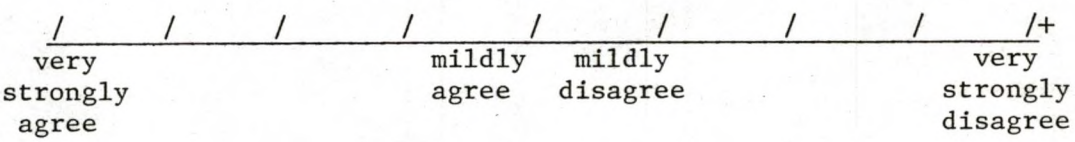
20. I am able to remain calm even though those around me worry.



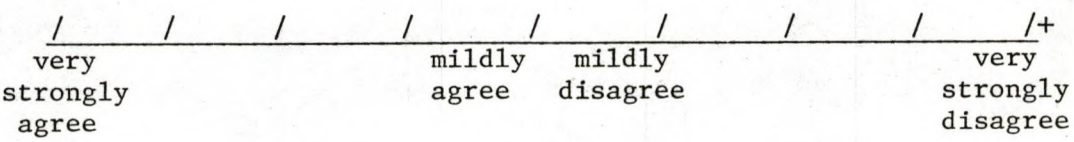
21. When a friend starts to talk about his problems, I try to steer the conversation to something else.



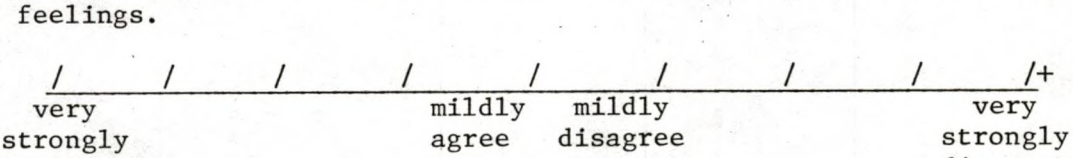
22. Another's laughter is not catching for me.



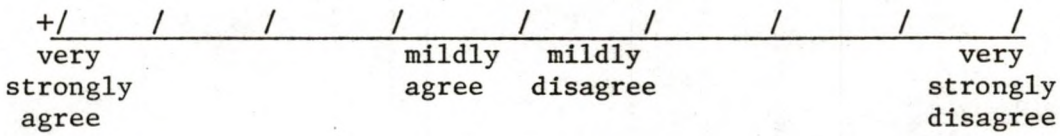
23. Sometimes at the movies I am amused by the amount of crying and sniffling around me.



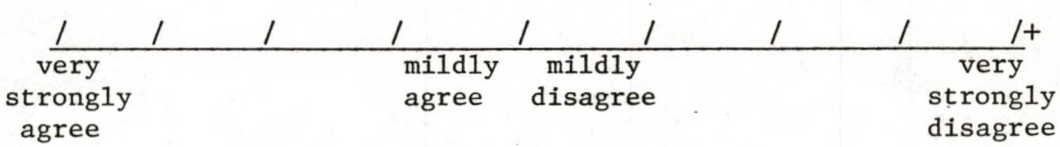
24. I am able to make decisions without being influenced by people's feelings.



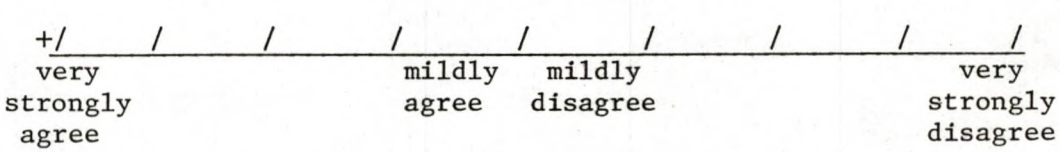
25. I cannot continue to feel OK if people around me are depressed.



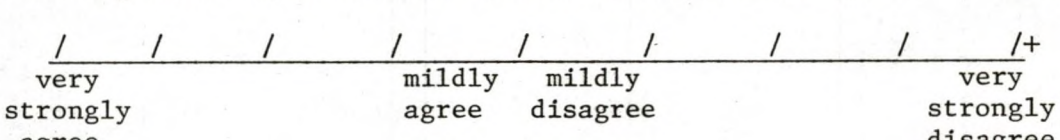
26. It is hard for me to see how some things upset people so much.



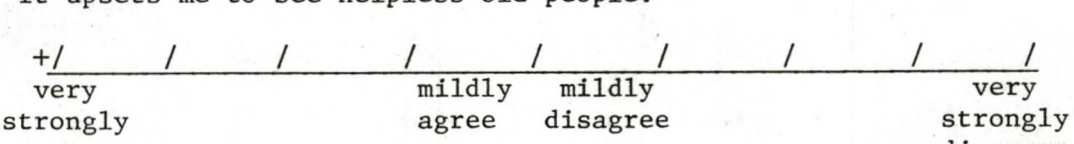
27. I am very upset when I see an animal in pain.



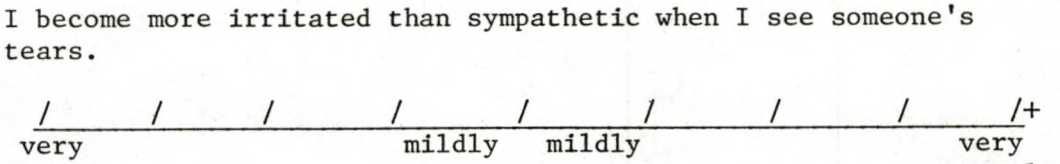
28. Becoming involved in books or movies is a little silly.



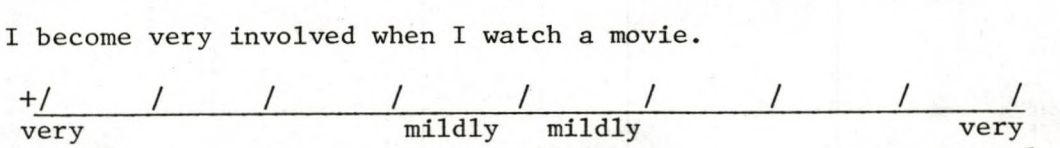
29. It upsets me to see helpless old people.



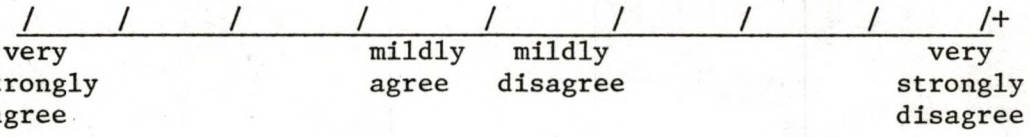
30. I become more irritated than sympathetic when I see someone's tears.



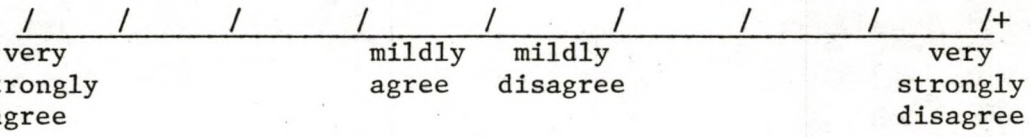
31. I become very involved when I watch a movie.



32. I often find that I can remain cool in spite of the excitement around me.



33. Little children sometimes cry for no apparent reason.



APPENDIX F

INSTRUCTIONS TO SUBJECTS

INSTRUCTIONS TO SUBJECTS

You are about to participate in an experiment on word meanings. For this experiment you will be asked to assign meanings to nonwords. These nonwords are pronounceable sounds which consist of between two and six letters. You will be viewing them through the table viewer in front of you. Look through the eyepiece of the viewer, and you will see an "X" in the center of the viewing field. Do you see this? On each trial, I will ask you to fix your gaze on the "X" when I give the signal, "ready." Shortly following the signal a nonword will appear on the left or the right of your viewing field. When you see this nonword (or word-sound) you are to associate one of three colors with it--red, blue or green. Think only of those three--green, red or blue. After you choose one of these colors, announce it loudly in the microphone in front of you. Your response will stop a timer connected to the apparatus, and we will then start another trial.

Remember, choose only from the colors blue, green or red. Do you have any questions?

APPENDIX G

LIST OF STIMULUS ITEMS

LIST OF STIMULUS ITEMS

Target Items Listed With High Frequency Color Associate

NERD -- green

DING

SOOS

HAF -- red

IK

MU -- blue

ZAH -- red

LUM -- blue

TOD -- red

SOOL -- blue

ITE

ELBE

KLAK -- red

SLE

TUR -- green

ETH

DER

SKAF -- red

KOF

OOM -- blue

ISH -- green

ZING

MUMLE -- blue

COM -- blue

SKRINT

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