THINKING: A MULTI-DIMENSIONAL APPROACH

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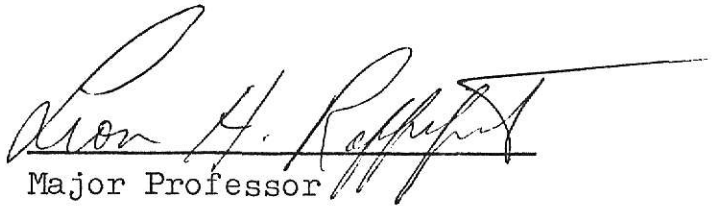

Major Professor

Table of Contents

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Part I

Introduction

Man reveals in the way he approaches the meaning of his own existence something of the nature of himself. This nature, sometimes fleeting, sometimes striving, at other times fragmenting, nevertheless unceasingly shapes the texture of man's relationship to his environment. It seems to follow, then, that the very act of relating, the very act of thinking may, itself, contain important clues as to how man comes to know and to adjust to his environment. That is, cognitions may have meaning to the extent that they are anchored in time; cognitions may derive their meaning from where they have been and where they are tending.

It is the general purpose of this paper to explore a particular tradition of theoretical notions about the nature of thinking. We will focus, first, on certain assumptions about the nature of man; secondly, on relevant empirical data; and finally, on the rich possibilities for extending this empirical work into yet other intriguing areas of inquiry.

More specifically, this paper will survey some of the more important philosophical-historical ideas about the nature of thinking, culminating in the approach of Ganzheit Psychologists of the 1920's and 1930's. We will then consider, in turn, the theory and supportive empirical evidence gathered by two of the major proponents of Ganzheitpsychologie, Werner and Sander, respectively. In this connection, two new experiments will be

offered to illustrate the feasibility of such an approach. Finally, we will discuss the possibilities for further research in a broader context.

Chapter I

Historical Inquiries Into The Nature Of Thinking

Philosophical Background

How man relates to his environment, how he comes to know and to understand it has deep roots in Western philosophical tradition. Rather than tracing each step in the philosophical evolution of modern conceptions of man's understanding of his world, we might alternatively tap some of the more relevant historical contributions.

One of the earliest statements on this theme comes from Plato. Plato has suggested a hierarchy of adjustment patterns. Further, he has argued that 'passions', to the extent that they represent rather low levels of adaptation to the environment should ideally be actively controlled by the more rational modes of functioning characteristic of civilized man (Kaplan, 1967). It does not follow, then, that reason is necessarily derived from affect, nor is it necessarily reducible to affect. Throughout his writings, Plato has demonstrated a respect for the integrity and for the uniqueness of an organism's functioning at any level of mentation.

Plato argues, analogously, that his dichotomized notions about how man deals with his world, can also be applied to the structuring of groups, or societies (Kaplan, 1967). In a sense, then, primitive societies might be best characterized as having predominantly passionate orientations toward their environment.

Aristotle has approached the problem of man's adjustment in terms of process, i.e., the progressive development of man's growth potentialities (Kaplan, 1967). Through the active interplay of organism and environment, novel ways of structuring the world gradually emerge. Here it is implied, as in Plato's writings, that these higher structures have an autonomous existence. For Aristotle, then, man's development, as a measure of higher levels of adaptation to the environment, proceeds from an impoverished knowledge about himself toward sensitivity to his own uniqueness; from a diffuse recognition of his phenomenal world toward a differentiation of that world; and from a self-perpetuating system toward a self-actualizing system.

In attempting to integrate the thoughts of both Plato and Aristotle, one is struck by a pervasive teleological theme running through their writings. Both are teleological to the extent that they each specify preferred modes for obtaining knowledge that men should ideally develop as the best means of perceiving and interpreting their world. And secondly, implicit in both philosophies is a genuine respect for the integrity of a functioning organism at any level of operation.

In Leibnitz's monad theory, such teleology assumes a dominant role. As elements of cognitive structures, monads, each as a center of force within itself, vary one from the other in terms of their power (Tomlin, 1963). Each monad, regardless of its status in this power hierarchy, is self-sufficient and forms a unity onto itself. Being self-motivating, a self-propelling force, each monad as it proceeds along its predetermined course is capable of

capturing the totality of the universe from its own vantage point. In the simplest monads this may be represented by a diffuse relation to the world, for the more complex monads, it is more in terms of a differentiated perception (Kaplan, 1967). Summarizing Leibnitz's conception to the human mind, we might conclude that the mind is a dynamic force, purposeful in its nature, actively engaged in constructing a reality at infinite points in time, and at every possible level.

Kant is the pivotal figure in this historical sketch. Common to the philosophies discussed thus far, is the assumption that more accurate approximations to truth, to the way things really are, is a direct by-product of functioning at the higher, more complex levels of thought. For example, the exercise of reason, as indicative of those higher forms of adjustment to the world, leads eventually to a more precise mirror of reality than say, reliance on our emotional experience. In this view, the organism and the environment are both separate systems. It is then, the ultimate aim of this organism to strive to obtain a perfect match to a rather static, Pristine Reality. Kant took dead aim at this a priori organismic-environmental estrangement. He was not so concerned with truth as he was with how any knowledge is obtained. How is it possible to know?

Kant believes all knowledge is mediated. That is, a phenomenon exists only in so far as we "participate in its construction" (Watson, 1968, P.400). It is thus some inherent quality of the organism itself that sets up, a priori, the possibility for knowledge of any event. The organism has certain

categories or principles for ordering i.e., notions of causality, totality, etc., into which the content of experience can be assimilated. With the additional Kantian notions of "intuitions of sensibility" i.e., notions of space and time, he makes it plausible to argue that forms, structure, are prior to experience and make experience and understanding possible. Here Kant is anticipating the Gestaltists claim that the whole is logically prior to its constituent parts. The elements or contents of experience only are made possible when the organizational rules, the whole, is specified. Kant is implying, here, that no matter how primitive or developed an individual is in the way he organizes his world, the mind always acts to form a unity of experience, to create an object which has meaning for that individual (Tomlin, 1963).

With respect to reason, Kant adds that it is flatly incapable of understanding things-in-themselves (Tomlin, 1963). Reasoning, then, does not necessarily lead one to more accurate representations of reality. Indeed, Kantian notions suggest that instead of searching for the ideal way of construing reality, we might derive more understanding of the thinking process itself by looking at the complexity of the organizational principles involved at any level of functioning. Further, in contrast to the prevailing intellectual climate of his time, Kant understood that there is no one way of cognizing the environment but that there are multiple ways of knowing, many no less differentiated than any of the others. The passions are no further removed from truth than is experience-tempered reason.

In sum, then, before, Kant, most philosophers asked: "given that we experience, how close does this experience approximate to an ultimate truth?", thus focusing their attention on the best means to achieve this criterion. Kant, taking one step backwards, inquired into the very nature of experience, thus shifting attention to questions centering on the underlying processes, the structure, the interaction of organism and environment out of which experience formally emerges.

We might also make a brief mention of Rousseau, here. Writing at approximately the same time as Kant, this French philosopher stressed that child behavior follows certain organizational laws that can be described independently of the degree to which they reflect adult culture (Tomlin, 1963). That is, the structures underlying a child's experience are qualitatively different from that of the adult's. Warning man, further, about the pitfalls of reason, Rosseau cogently argues for the recovery of spontaneity in expression and flexibility in imagination.

Integrating the views of both Kant and Rousseau, we are led to the conclusion that individuals, or for that matter societies, tend to relate to their environments in diverse ways, at different times, under varying circumstances, such that the rules for organizing experience in one context might be most effectively investigated, independently of experience in any other context. Relating is, experientially at least, a discontinuous process.

Formal Psychological Approaches

Turning now toward a more empirical orientation, nowhere have

the issues mentioned above been brought into sharper focus than in the German psychology of the late 19th and early 20th Century. Based on the ongoing research in his lab at Leipzig, Wundt proposed a "pure-consciousness psychology" (Sander, 1930, P.189). He restricted his research to an analysis of the contents of consciousness, as immediately apprehended in the form of the elements of sensory data i.e., images.

Kulpe, founder of the Wurzburg School, believed one could also study thought processes experimentally. He diverged from Wundt's established methodology in asking his subjects to recall their experience in thinking about solutions to rather complex tasks, thus emphasizing process (Watson, 1968). Here, again, recurs a typical Kantian theme, disguised as it is in the form of the structuralist vs the functionalist dialectic. While Wundt, the structuralist, asks what is knowledge, what are the elements of consciousness, Kulpe questions how knowledge is possible, what are the dynamics of consciousness. And again, analogously, a new area of inquiry emerges. The Wurzburgers find that thinking can proceed with "imageless thoughts", representations of meaning not associated with particular images. In fact, those sensations or images that are present add little to the understanding of how a particular concept or judgment was formed. Kulpe concluded that content and function-process are both facts of mental life, indeed separable in experience (Watson, 1968). As we shall see shortly, this Wurzburg emphasis on process paved the way for the development of a Holistic psychology at Leipzig in the 20's and 30's, a site which had earlier been the corner-

stone of Wundtian elementaristic psychology.

Yet another focus of controversy gathering momentum in the early decades of the 20th Century revolved around the Verstehen-psychologie of Spranger, Buhler, and Klages. Their views that mental life should be described rather than explained, ultimately culminated in a view of psychology as humanistic-literary rather than physicalistic-scientific (Kvale, 1964). Accordingly, they were most concerned with such problems as meaning, motivation, and affect. The importance of the Verstehenpsychologie was and still is, not in terms of the people converted to its perspective, but rather, its indirect influence in persuading many psychologists that if they are determined to work with such problems as "understanding", new methodologies other than those borrowed from the physical sciences need to be developed that are peculiarly suited to exploration of this kind.

One important example showing that such new methods <u>can</u> be developed to work effectively, is amply demonstrated in the psychology of Wertheimer, Kohler, and Koffka. More explicitly, in reaction to Wundt's emphasis on the elements of consciousness, there arose the Berlin Gestalt School, whose primary goals were the elucidation of the organization, the intrinsic structure, and the meaning of perception (Flavell and Draguns, 1957). A teleological quality emerges from the Gestalt emphasis that organisms have preferred modes of perception, modes that follow certain geometric regularities. One finds in Gestalt Psychology an explicit recognition of the Kantian notion that structure or whole is logically prior to its constituent parts.

Dissatisfied with the early Gestaltist focus on perception as a final cognitive product, Kruger founded Ganzheitpsychologie or what is commonly called the Holistic branch of Gestalt Psychology, which treated perception in terms of a process intricately tied to the totality of feeling (Flavell and Draguns, 1957). For example, from studies on the temporal development of percepts, Sander and Werner have concluded that certain "feeling-tones" or affects are themselves bound to the meaning of things (Kvale, 1964). Specifically, Sander, one of the major proponents of the Holistic-Organismic approach, set about attempting to identify the existence of a number of conceptually distinct stages of thinking, separated temporally from the final, stabilized product of thought.

From our standpoint, then, the Leipzig Gestalt School's approach to the nature of thinking is a rather complex integration, rooted diffusely in Western philosophy, especially that of the Continental philosophy of Leibnitz and Kant, and at the same time rooted more directly in the converging themes of an empiricist oriented German Psychology: Wurzburg emphasis on process; Gestalt emphasis on meaning and structure; humanistic emphasis on meaning and feeling.

Current Approaches

Werner, from his work at the Hamburg lab in Germany, and at Clark University in the United States, has broadened the base of Holistic Psychology from one focusing primarily on perceptual development to one capable of encompassing any phenomena that

might manifest the characteristic features of a developmental progression. In a concrete sense, then, a discussion of Wernerian theory would aid in clarifying how many of the ideas developed in this first chapter have been expanded and, in turn, incorporated into a general theoretical view. Toward that end, we will first discuss the major components of Wernerian theory and then its application in a variety of contexts.

Chapter 2

Wernerian Theory: The Spiral Nature of Cognition

It is not our intention to present Werner's Theory in total (see Werner, 1948; Werner, 1957; Werner and Kaplan, 1963; Langer, 1969), but only to discuss his theory in terms of the assumptions it makes about the nature of man.

Werner begins with the Orthogenetic Principle: "Whenever development occurs it proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation, articulation, and hierarchic integration." (Werner, 1957, P. 126). At work in Werner's Principle are 5 basic and interrelated assumptions. The first and probably most basic is the developmental assumption that the nature of organisms (individual minds, groups, societies) can best be understood by studying their changes, their processes, their emerging properties. There is next a teleological notion which assumes the organism to be goal-directed (Werner and Kaplan, 1963). Movement toward increasing differentiation of the component parts of the world is simultaneous to the organizing and ordering of these parts into more complex integrated patterns.

The Orthogenetic Principle is also organismic-holistic in that it leads one to study that which has meaning for the organism. Meaning is looked for with respect to the functioning of the organism as a whole. Discrete acts become meaningful by reference to context-wholes. A fourth cognitive assumption directs one to

inquire about the nature of knowledge, what tools an organism has available for actively organizing and interpreting his world. Finally, the interactionist assumption holds that any knowledge obtained is always a product of the organism acting within a variegated environment. In this section, we shall show how these 5 assumptions are interwoven into the very fabric of Werner's Theory.

The Orthogenetic Principle is specific, including only those changes which manifest a particular sequence, a particular direction. However: "At the same time, it allows one to examine every process to determine the extent to which it reveals features of increasing differentiation and hierarchic integration over time" (Kaplan, 1967, P.83). Thus, freed from a committment to a particular time base, orthogenesis can be used as a standard criteria for comparing the structural changes of different evolutionary processes. For example, phenomena such as phylogenesis (biological development), ontogenesis (long-term individual development), microgenesis (development of percepts and thoughts), ethnogenesis (genesis of cultural systems), and pathogenesis (pathological development) can be studied and, in turn, compared to determine the extent to which each manifests characteristic structural changes analogous to those specified in Werner's principle (Langer, 1969).

Later, in an effort to expand the applicability of Orthogenesis, Werner and Kaplan disassociated development from any time base by comparing phenomena in terms of their complexity of organization, higher status being assigned to increasing degrees

of differentiation and hierarchic integration. In other words, phenomena are compared or contrasted according to the extent that they reveal analogous patterns of organization or, alternatively, in terms of where they stand in the chronology of development. Werner's approach is heuristic in that it challenges social scientists to apply the Principle of Orthogenesis to virtually all social phenomena, assessing the utility of Werner's law on that very basis.

The Structuring of Experience

For an organism to experience, it must first have rules for obtaining knowledge; for organizing and relating itself to its environment. What an organism experiences then, is largely dependent on the character of its rules, the structures it can utilize in dealing with the environment at a particular time or in a particular situation. Here, the focus is on the cognitive aspects of Werner's theory. "Cognitions are essentially the means an individual has at his disposal for coping adaptively in the world" (Mehrabian, 1968, P.132).

Werner assesses the evolutionary status of any particular way of structuring the environment in terms of where it falls on a continuum from diffuse to articulated; that is, from a rather homogeneous and uniform way of organizing the environment towards a level where the parts are clearly distinguished and subordinated to the other parts in a meaningful context-whole (Werner, 1948). For example, a child who is afraid that a spider will bite him also assigns to the web, to a portion of the web, or even to any-

thing associated with the spider a property of "biteability". Thus, at diffuse levels of cognition any part has the "quality-of-the-whole" (Werner, 1948).

Having discussed the general nature of structure, we are now in the position to describe its content. From this developmental perspective, one which indeed has much in common with Piaget's (see Mehrabian, 1968; Langer, 1969), we can now look at the specific content of these rules and more specifically, at what point in time they generally dominate the organism's activities. For example, in ontogenesis, knowledge of the environment organized in a sensori-motor fashion is usually the first kind to emerge developmentally. This type of knowledge is gained through movement or kinesthetic feedback i.e., shakability, bouncibility, graspability of objects. At a later cognitive stage, the perceptual qualities of things dominates the organism in that, for instance, a child begins to retain stabilized perceptual objects, represented in such geometric properties as roundness, or angularity. For a child, with the gradual emergence of abstract language, cognitions take the form of grasping perceptual units, conceptual categorizations i.e., the class of trees, of balls. Thus, at this latter stage, a child recognizes and organizes his environment conceptually rather than relying on the earlier modes of adaptation.

While the first 2 stages of cognition are concrete in that they are dependent on immediate sensory stimulation, this latter conceptual mode is abstract to the extent that an event can be re-presented again at a later time or in a different context.

One doesn't have to see a tree to talk about it. Here, the operation is in a conceptual sphere which allows the "hypothetical, the possible rather than restricted to the actual" (Mehrabian, 1968, P.138). Although this latter means dominates adult activity, the earlier processes can continue to grow or even regain their status under special circumstances (Werner, 1957; Werner and Kaplan, 1963).

In a general sense, all 3 stages, although representing different means, aim toward a common goal, that of maximally coping with the environment. Processes that are genetically at different levels but are directed toward the same ends are called analogous processes (Werner, 1948). One can make the general statement that means, in this case, the structure, is never separate from the ends that it serves, but that the means and ends are interdependent. Two children attempting to solve a jig-saw puzzle, one operating sensori-motorically, the other perceptually may both arrive at identical solutions. However, each child reached his solution via different rules. In the same vein, an activity such as fantasizing for a child may represent attempts at re-presenting some event in his life, while for an adult, the same process can serve entirely different ends, representing the realm of the future, its possibilities and implications. Fantasies can serve one function for a child and yet quite another for an adult.

Structures are ways of representing the whole. Wernerian theory is organismic to the extent that it holds that the whole is prior to its parts, to the extent that it is concerned with

meaning. Any existing element is always an outcome, an outcome of a process in which these elements emerge with a given status or meaning. "Stable elements do not precede systemic rules of organization, but become determinate through such rules" (Kaplan, 1967, P.76).

Taken together, these assumptions lead to a view of the organism as constructing his environment, an organism that has the inherent qualities to give its world form, to make sense of it. As Sander has put it, the activities of the organism are "architectonic" (Sander, 1930).

The Content of Experience

In describing the actual content of experience, Werner has used the syncretic - discrete dimension. At the lower levels of development, where the structure dictates a diffuse relation to the world, syncretic activity dominates in that things are perceived as fused, undifferentiated, and global. At this stage, there is "limited differentiation of object and subject, of perception and pure feeling, of idea and action" (Werner, 1948, P.59). For example, things are perceived in terms of their dynamic qualities, in terms of their utility, as things-of-action. A brain-injured patient was able to recognize a key only when it was inserted and turned in the lock (Werner, 1948). An organism reacts primarily to the dynamic qualities of an object and only secondarily to an object's static qualities like color.

In general, Werner is pointing to the existence of certain physiognomic modes of thinking where there is little or no functional distinction between subject and object; where the

motor, affective qualities are globally fused with the more static everyday geometric-technical characteristics of color and shape. In recalling certain pictures or scenes, one hears adults uttering such phrases as "It had an angry quality" or "That was a moving scene": However, unlike a child, an adult has the ability, if the situation demands, to distinguish between the scene's geometric and physiognomic qualities.

Another example of syncretic functioning is apparent in a child's inability to differentiate his own perspective from that of others (Kohlberg, Yaeger, and Helmholm, 1968). Development proceeds with the child's recognition that his needs and wants are separate from the existence of another's, or of other events.

When Werner turns to consider adult functioning in civilized societies, he speaks about the discrete side of the continuum where mental functions, or acts of any kind have specific, unequivocal meaning.

The Dynamics of Experience

That experience does change from moment to moment is a critical aspect of the Orthogenetic Principle. It changes from global perception to differentiated conception. Overall, the assumption that an organism's thinking becomes more differentiated, more articulated, and more hierarchically integrated implies that experience changes in a continuous, unidirected, uniform manner. But, if one now focuses on the specific structures, the concrete operations at each stage in the developmental sequence, and from that plots the sequence of changes, there emerges a picture of the discontinuity, of the multi-directionality, of the

multi-formity of development.

Development is discontinuous; while a child's construction of reality, his architectonic, is less differentiated than that of an adult's, nonetheless, the conceptually-based schemas which an adult has available to interpret his world can be structurally novel and, indeed, can never be derived from a child's dynamic structuring of his environment.

Development is multi-directional; although "lower", early emergent levels of cognition (in our culture, motor-affective, and perceptual organization) tend to become sub-ordinated to and controlled by the "higher", late-emerging conceptual modes of thinking, this does not negate the possibility that these lower levels can grow, as in the physiognomic perceptions and physiognomic language of artists and writers, respectively, to a level not below that of abstract, logical thinking (Werner, 1957). Finally, the idea that development is a multi-form operation means simply that the specific forms of awareness used in relation to certain goals may differ depending on the organism's genetic level of operation.

We have previously stated that advanced stages of thinking emerge from lower stages; that early genetic forms may grow while being subordinated to higher forms; and, finally, that these genetic forms differ qualitatively one from the other. But what is the specific form that development takes? How does the development of thinking proceed? According to Kaplan and Werner, 1956, it proceeds in <u>spirals</u>. To progress, one necessarily regresses. One partially returns to the more primitive

global modes, where there is an epistomological reorganization and movement, then, toward new, higher, more differentiated levels of organization. There are essentially 2 stages involved in this regressive operation: "creative disintegration" (Silverman, 1970, P.63), where there is a dedifferentiation of existing, schematized, or automatized behavior patterns, and "creative reorganization" (Werner, 1957, P.139), where there is an actualization of primitive levels of behavior from which undifferentiated phenomena emerge.

Understanding somewhat of the mechanics, of the form of development, what, then, moves the organism along this developmental path? Here, we are shifting our focus to the forces that come into play as organism and environment interact. Werner believes that there are 2 primary forces, one of which is conservative, inclining the organism to preserve its "holistic" integrity, and the other, a counter-balancing progressive force directing the organism to reach out, to move toward greater differentiation (Werner and Kaplan, 1963).

Werner has used a fixity - mobility dimension to describe the simultaneous interplay of these 2 contratendencies. On the one end, fixity as the conserving force, is continually integrating the input from the environment into the pre-existing schemas of the organism, while on the other end, mobility represents those forces for expansion, for differentiation, for further diversified ways of cognizing the environment. The ultimate aim of this development is to maximize stability, which entails a reduction of growth, automatized action and reaction, attainment of equilibrium (Werner, 1957).

Where the structure is diffuse, and content is syncretic, this tendency toward fixity imposes a rigidity on functioning. That is, the organism has a tendency to respond stereo-typically although the environmental demand on him might vary quite drastically. This predisposition to react in the same way over and over again might be highly adaptive in a stable environment, but can be maladaptive when the environment changes radically (Baldwin, 1967). On the other hand, where the structure is articulated, and content discrete, the organism can assign new stimuli to a whole hierarchy of organizational levels. Here, fixity, the tendency to rely upon that which is already available, implies an adaptive stability because responses can be appropriate across many different situations.

The polar aspect of fixity, that of mobility, operates also at each cognitive level. Mobility is a force for change, for continual movement toward increasing elaboration of parts. So, at the primitive modes of organization, this force for change produces extreme accommodatory behavior or lability in the responses of the organism. Randomness in behavior and lack of conventionality are characteristics of lability. At the advanced levels, it allows the organism to respond differentially as appropriate to the situation. The organism has a flexibility in that it can shift rapidly from one level to another. In sum, then, cognition at the higher levels is characterized as stable-flexible.

From an organismic-developmental standpoint, Werner concludes that "the lower levels of development are necessary for the higher

ones to be manifested, but that the higher levels are not collapsible into the lower ones" (Kaplan, 1967, P.67). This is, overall, a statement of teleology. But, in the first part of this statement, there is also a clear declaration that development follows a particular sequence. From this, it would be a mistake to assume that Werner espouses a purely maturational or nativistic view of development. Maturation theories hold that there is an innate process of growth that follows an inner pattern which can either be "arrested or distorted by deficits of stimulation" (Kohlberg, 1968, P.1019). This process of growth is wired into the organism. Werner does not agree. For him, the contents of mental stages are the result of an interaction between "certain organismic structuring tendencies and the structure of the outside world, rather than reflecting either one directly" (Kohlberg, 1968, P.1020). For example, "The development of a stabilized percept can be conceptualized in terms of a moving away from some ideally accurate or objective way of responding, and in terms of a moving toward an assimilation of events into preferred patterns of organization" (Brunswik, 1956, P.132). According to Werner, the forms of development are invariant but the contents are determined to a large extent by cultural factors. Environmental factors never change the sequence of development but can speed up, slow down, or even halt development.

Something more than a restatement of the holistic principle is implied in the latter part of Werner's statement; it is, in one sense, an argument against reductionism. One level is unlike another; to understand one level inquiry must necessarily be

directed to that level. This argument against reductionism is also an argument for a formal distinction between statements of understanding, of description on the one hand, and statements of explanation, of cause on the other. Causal arguments do not illumin our knowledge of an operative structure, nor of the content of an experience. Describing the factors that lead to a schizophrenic break tells one next to nothing about the structure of a schizophrenic world nor the ensuing content of a schizophrenic experience. For such content, one must understand how a schizophrenic organizes his world in addition to the social context from which he operates. Before making assumptions about phenomena, one should, first, clearly specify the perspective from which one wishes to understand that phenomena. In sum, Werner's view is similar to that expressed by Cassierer (1961, P.159): The forms of consciousness "are irreducible to each other or to some tertium quid external to them".

Chapter 3

Wernerian Theory: An Empirical Inquiry

The purpose of this section is not an exhaustive review of the research related to Wernerian conceptualization, nor is it our intention to evaluate the validity of this particular approach. Instead, this section indicates the areas to which Werner's theory has been applied in order that one may get a feeling for the peculiar nature of the questions that are being asked, a feeling for the way a particular problem is then attacked, and finally a feeling for how the answers to these questions aid in illuminating this particular view of man.

Comparative Analysis

In his book on the *Comparative Psychology of Mental Development*, Werner inquires into the nature of the formal similarities between primitive activities, whether they be of primitive biological organisms, of primitive cultures, of early ontogenesis, or of the primitivity of pathological regression (Werner, 1948). For one example, Werner points out that a syncretic mode of adaptation characterizes reality, such that there is a fusion of subject and object. Objects are distinguished in terms of their dynamic, their motor properties, their motility i.e., "things-of-action" (Werner, 1948, P.59). For dogs, the command "chair" may mean anything he can jump on, lie down on. These may be independent of the objects' perceptual properties. Similarly, for an infant, a rattle is something to be bitten, independent of

its geometric properties. For an Andaman Islander it is not the food he eats that distinguishes it from other aspects of nature, but rather the dynamic power-spirits in the food itself that determines its particular nature (Werner, 1948). For a brain-damaged man, it is not the formal qualities of the key that he recognizes, but the identity of "key" as something inserted and rotated in a lock of a door (Werner, 1948). It is, thus, the functional characteristics of things that are identified in primitive perception. Certainly, Werner recognizes that there are differences in the functioning of various organisms. But, he has chosen to attend to functionally similar behaviors in the hopes of finding an ideal developmental progression, one that is comparable across genetic levels.

Brunswik has pointed out numerous parallels between ontogenesis and the history of science (Brunswik, 1959). Brind, under the direction of Brunswik, undertook a study of the development of criticism in children. Brunswik then compared the resultant sequence of stages of critical thinking that Brind identified according to the way in which new propositions in science are accepted or rejected. For example, the earlier stages of criticism in children, that of "naive credulity", followed by feeling of uncertainty, mirrors the gullibility and gutty confusion, respectively, that predominate at the pre-scientific level (Brunswik, 1959). Along similar lines, Kuhn cites quite a rich account of the structures of a developing scientific construct (Kuhn, 1962).

Ontogenesis

Studies dealing with the contours of individual development, that of ontogenesis, have primarily focused on the differentiation of the cognitive aspects of development (Piaget, 1952; Piaget, 1954; Kaplan and Werner, 1956; Sutton-Smith, 1966). In one study on the ontogenesis of word meaning, Werner and Kaplan found that not only is there a linear relationship between accuracy of word meaning and age level, but more importantly, that at each age there are "emergent" rules in fixing the meaning of words (Werner, 1957; Baldwin, 1967). Implied here is the notion that accuracy as a measure of objective achievement tells one little about the underlying process involved in the achievement, and hence little about the developmental status of an organism. In fact, objective accuracy alone may occasionally create a distorted picture of development (see DeSactis, 1928; Werner, 1957).

Studying problem-solving in terms of genetic stages, Duncker (1945) found that creative thought typically involves some regression before progressing along new lines of problem solving.

Even within the Wernerian framework there have been few attempts to study the affective aspects of ontogenesis. Bridges, in her observations of children, has described the stages of emotional development. The undifferentiated excitement of early infancy gradually develops into such emotions as distress, excitement, and delight, which in turn, differentiate into even more discrete emotions (Bridges, 1932). It is also interesting to note that Anna Freud saw the value of studying and classifying ego defense mechanisms on a genetic basis, a notion that has been

neglected in current psychoanalytic research (Brenner, 1957).

Physiognomic Thought

One aspect of mental activity that has been researched rather extensively is that of syncresis. Syncresis dominates the mental activity in the primitive sphere. Knowledge of an object, or another person is conveyed by the way the object moves, its dynamic qualities, and by the object's affective qualities; whether it "feels good" or bad. In the world of the primitive, there is no a priori separation between objective, or what Werner called the geometric-technical, the matter-of-fact attributes, and the sensori-motor, affective behavior of the organism itself. They are a unity. The organism actively constructs the objects of his world.

Syncretic perceptions that manifest these characteristics are called physiognomic. Krauss asked subjects to match certain lines, i.e.,  , with the emotional content of the words, iron, gold, silver (Werner, 1948). He found that 80% of his subjects were able to match the words to the line drawings in an identical manner. From other experiments, Krauss concluded that the geometric properties of things was not related to the physiognomic properties of those same things. It is interesting to note here, that Rappoport (1968), using triangles and circles in artificial social interactions, found that the approach movements of the objects, rather than their geometric properties, was the more significant factor in determining the objects' "personality".

Werner argues that lower level functioning is really never

lost, but that it becomes embedded within the complex organization at higher levels (Werner, 1948). Thus, it is not surprising to find certain people, among them artists, who develop physiognomic perception to quite a high level, as in describing a sea coast as the beckoning calls of the Sirens in Homer's "Odyssey". This topic will be expanded later in our discussion of microgenesis.

There have also been numerous studies on physiognomic language (Werner, 1955). This is where the symbol and its meaning are intimately fused. For example, Kaden found that words connoting "rising" or "falling" presented at eye level to dark-adapted subjects were seen as displaced spatially in an upward or downward direction, respectively (Kaden, 1953; Kaplan, 1955). Raeff found that identical words embedded in a poetic and prose context respectively functioned differently (Werner, 1955). For instance, one of the words ascribed to the word "velvet" was "soft". On further inquiry, while "soft" was seen as a property of velvet in the prose context, in the poetic context it was the letters e-l-v that sounded "soft". In still another context, Brunswik has cited an experiment in which children varying in age from 4 to 10, were asked to find a superordinate word that fit pairs of words, such as "cup and kettle" (Brunswik, 1959). For young children, the most prevalent classification was in terms of pleasantness---unpleasantness dimension, while categorization in terms of an object's usefulness, or its dynamic qualities was found to be the second most preferred response. In line with Werner, Brunswik found that there is an increase in the objective, things-in-themselves responses with increasing age, finally

asymptoting at the age of ten.

In sum, then, physiognomics is a concrete, dynamic, motor-affective mode for relating to our environment that may, under special circumstances, play an important part in an organism's activities.

The Concept of Differentiation

While a number of the studies cited previously have been anchored in Werner's Orthogenetic Principle, the studies presented in this section are primarily concerned with delineating the Wernerian notion of increasing differentiation, and of increasing hierarchic integration. Witkin, whose primary aim was to find stable personality differences in children, reported that a child's ability to differentiate a field, that is, to separate it into its discrete parts increases with age (Witkin, 1962). Using such things as embedded figures, he defined the variable "field-independence", as a component of differentiation. Kagen (1964) and his co-workers using a wide variety of tests, including a "hidden figures test", defined an "analytic" attitude in a child as that tendency to analyze visual arrays into their component parts.

Turning away now from the differentiation of objects, or events, to interpersonal perception, Crockett et al have described 2 components of cognitive complexity: Degree of cognitive differentiation --- indicated by the number of discrete elements in the system, and Degree of hierarchic integration --- indicated by the number of supraordinate constructs which bind together the discrete elements (Crockett, 1965). This has been applied to

assess cognitive complexity in various person-perception contexts (Crockett, 1965; Kaplan and Crockett, 1968). Hopkins, using this notion of cognitive complexity in an ontogenetic framework, found that with increasing age, a child's description of his peers becomes more differentiated and organized (Hopkins, in press). She also found "a qualitative shift from the use of egocentric and concrete constructs toward the use of nonegocentric and abstract constructs with increasing age" (Hopkins, in press).

Friedman, Phillips et al have constructed a genetic scoring system of the Rorschach Test within a Wernerian framework (Friedman, Phillips, et al, 1954; cited in Werner 1957, P.140). Hemmindinger, using this analysis in a cross-sectional study of children from the age of three to eleven, discovered a trend from the predominance of global, diffussed responses at lower age levels, to more detailed, integrated responses at higher age levels (Werner, 1957).

Sensoritonic Theory

Emphasizing the organismic aspect of Werner's theory, Werner and Wapner put forth a Sensoritonic Theory of perception, maintaining that perception is a particular relationship between the state of the organism and the stimuli impinging on the organism from the object (Wapner and Werner, 1957). In other words, how an object is perceived is determined not only by its physical, objective dimensions, but in turn, also from the context which has meaning for the organism. This is essentially a compromise position between the "projectivists" emphasis on internal dynamics

and the Gestaltist Law of Pragnanz, as the primary determinants of perception.

Kohler had subjects wear lenses that distorted their orientation to the environment (Baldwin, 1967). He found that the subjects' stages of perceptual adjustment to his environment paralleled Werner's notions about the development of perception in children. For instance, in the beginning subjects learned to move around and treat various encountered objects as things-of-action while not being able to specify the object's visual qualities.

Chapter 4

Sander's Theory: Aktualgenese

As has been pointed out previously, Werner's general developmental approach was actually an outgrowth of the Leipzig Gestalt School's almost exclusive emphasis on perceptual development. In this section, we will first examine some of the theoretical strains coming out of the Leipzig School, and then discuss more empirically-oriented, systematic approaches to the study of man's thinking relation to his environment.

The Holistic psychology of the 1920's and early 30's was primarily concerned with the processes involved in the formation of stabilized cognitive products, that is, completed percepts or thoughts. According to Sander, the major proponent of Aktualgenese (genetic realization, microgenesis), there are essentially two forces that co-determine the process of perception: 1) man's intrinsic structuring tendencies and 2) the stimulus input from the environment. This "interactionist" view was, of course, shared by Werner. But, where Werner's main effort has been to delineate the various stages of the developmental spiral, Sander has dealt with the oftentimes violent exchange of forces that move the organism along its developmental path. For Sander thus, it is this continual clash between organism and environment that actually establishes the foundation for the meaningful operation of those functional structures i.e., motor-affective, perceptual, conceptual, which were so carefully documented by both Werner and Piaget.

Theory of an Emotive Unity

Sander posits a structural dynamic principle (Sander, 1930). By this, he simply means that man naturally tends toward structuring his environment on a purely non-representational aesthetic basis. That is, we tend to structure forms in terms of maximizing their symmetry, their softness of curvature, their parallelity, their geometric regularity, etc. As Brunswik has pointed out, these rules of organization are similar to the Berlin Gestalt Law of Pragnanz (good form) (Brunswik, 1956, P.133). For example, in children's play activities such as sand box constructions, where there are no demands to be objective, realistic, one can find a natural rhythm, a symmetry, a simplistic beauty emerging from these forms. Or, in the adult sphere, one can find in the architecture, notably of the Renaissance, the period of spiritual reawakening, a predilection toward closed, unified, regular representations (Sander, 1930). One can also find this natural rhythm in the everyday activities of walking, working, and athletics. In sum, then, things apprehended aesthetically are intrinsically meaningful to man.

A second component of the structural dynamic is, essentially a prelude to Werner's Orthogenetic Principle. The organism strives for increasing degrees of differentiation, increasing degrees of articulation, this activity always taking place within a greater whole, towards a greater symmetry, a more regular compact whole. In other words, perception proceeds from a state of global primitivity towards a more structually differentiated, hierarchically integrated form of aesthetic experience.

Thus far, we have considered the structual dynamic in an ideal situation, where it is left to unfold in a rather passive environment. But the environment can in reality be a very active force moulding our perceptual experience. In contrast to the internal tendencies of organization, the external tendencies from the environment urge the organism to reconcile his construction of the world with formal, objective criteria. Now, when the dictates of this structural dynamic veer in a direction contrary to that of the stimulus pattern, violent motion erupts (Sander, 1930).

This motion can take 2 forms. Emotionally, we experience restlessness, agitation, anxiety, inadequacy, or weakness, all symptoms of non-fulfillment or violation of these internal and external structuring tendencies. Functionally, one stage is followed by another with a sudden jerkiness. For example, closure sets in, then fragmentation, only to close again, this opening and closing recurring again and again giving to us the feeling of motion, rather abrupt motion at that. In our own Pop culture, one can sense in the blues and hard-rock singing of Janis Joplin a peculiar restlessness, a strikingly powerful sound that is in a continual flux pushing toward something not yet formed.

Taken together, these notions imply that in real life situations, the precise nature of the structural dynamic for perception is invisible. While Werner sought its nature in the structure, in the actual contents of experience at selected stages of the developmental sequence, Sander believed that the

structural dynamic is more directly represented in our own states of mind, in our "feeling-tones" (Sander, 1930, P.192). That is, in the dynamic emotional expressions of man, may be found the inner strivings of our nature. Every aspect of development is at any point in time embedded in this emotive totality. For example, when a child is at play, his activities have meaning for him as expressed in his pleasure, in his concentration, in his feelings of completion in those activities.

This notion of an emotional totality can also be seen in Gestalt psycholgy. Gestaltists begin with assumption that the whole is logically prior, and indeed, temporally prior to its constituent elements. Consequently, specific elements derive their meaning from the whole in which they are embedded. Sander argues, analogously, that emotional expressions are also logically prior to the forms, the structuring of consciousness. It is, in fact, this quality of emotions that give meaning to forms. In summary, emotions are the most direct reflection of the operation of the dynamic interaction between the person and his environment.

Stages of Perceptual Development

Sander's Theory presents us with a way of looking at the continuity of the perceptual process, itself. We will try to follow this process, focusing first on the emotional aspects and then to the underlying structure that is being reflected at this level of feeling. Sander identified the first stage as a "primordial and feeling-like" (Brunswik, 1956, P.133) stage,

where things are recognized by diffuse feelings, as if in a vague, moving, global maze of lights. A second stage is one where the most primitive goals of the structural dynamic are realized, one which is experienced with much pleasure and joy. Here, while the structure of perception is still global, it does have form. It is undifferentiated internally, more regular, and more simple than the later forms (Flavell and Draguns, 1957). But, as these two contrary tendencies begin to clash, the organism tends toward states of volatility, impulsivity, rather sharp intense emotions. In this Vorgestalt, or preformulation phase, the structure is being torn apart and rebuilt again, resulting in an emphasis on detail, on fragments (Sander, 1930). As the power of the stimulus pattern increases, feelings of incompleteness, and of nonfulfillment tend to dominate the organism until a final resolution emerges and a stable cognition is constructed. This achievement is accompanied by feelings of adequacy, balance and maturity. Things are recognized as familiar, palpable, objects that from past experience have meaning for the organism. It is a compromise stage. Meaning is transformed from the aesthetic to the palpable. The structure is more differentiated, articulated, and more hierarchically integrated than that of the Vorgestalt.

All in all, emotions reflect the direction of mental development. When examined in isolation or even together, the sequence of cognitive stages postulated by Werner (further elaborated by Langer, 1969) possess no intrinsic meaning or value for the organism. One must, as an alternative, examine the various cognitive stages with respect to the superior emotive whole (Sander, 1930,

p.195). For example, one cannot simply sum up the overlaying structures of the developmental spiral in some linear fashion and still hope to define a more general construct encompassing the peculiar properties represented in the total array. On the contrary, if one knows, first, that an organism is in a state of irritation, he can then look to the structures that reflect this irritability, such as when the environmental input can no longer be comfortably assimilated by the ongoing diffuse structures of the person. These are meaningful structures only in so far as they reflect that state of irritability.

Empirical Approach

Sander and his students gathered together much empirical support for their theoretical position. Since percepts were formed in such a rapid manner, Sander proposed that creation of artificial conditions where the structural dynamic can come to realization. "The less the perception is decisively influenced by the physical condition, the stimuli, the more freely will the dynamic structure mould the phenomenal content in its own interest" (Sander, 1930, P.193). Such inadequate stimulus conditions as short tachistoscopic exposure, distorted focus, extreme miniature, bad lighting, and peripheral vision were used in order to block or slow down the perceptual process in order to experimentally examine the existence of these preconfigurations (Flavell and Draguns, 1957). For example, an irregular line figure lit up against a dark background and seen for the first time in extreme miniature, appears as a vague,

possibly swirling nebula of lights. As the figure grows, the emotional involvement of the subject increases. Construction, here, is dominated by the properties of wholeness, regularity, and homogeneity. But, as the figure matures still further, the process takes on a volatile quality where increasing detail is preferred to wholeness. Finally, a stable perceptual product is formed which is more irregular than the previous forms, but is experienced with feelings of balance, maturity, and fulfillment (Sander, 1930). "Out of the snarled dull-feeling, original modes of experience, the structural tendencies of the soul strive for organic differentiation with preservation of the psychic totality, and likewise from the other end seek to bring together that which is fragmentary owing to external determinants, and to subject all parts and aspects to a superior whole" (Sander, 1930, P.195).

In studies outside of the Leipzig School, experimenters using such diverse stimuli as geometric figures, letters of the alphabet, and Rorschach ink blots have confirmed the Aktualgenese notion of increasing differentiation (Flavell and Draguns, 1957). Using Rorschach cards as stimuli, Friedman, Phillips et al found that the wholes constructed at short tachistoscopic exposure are rather global and homogeneous as compared to those in the latter stages of development, where forms were more internally differentiated, and integrated (Phillips and Framo, 1954).

In a perceptual task using line drawings viewed under increasing degrees of tachistoscopic exposure, Brigden was able to identify 4 stages of development (Brigden, 1933; see also Smith, 1914). A first stage at 1/150th of a second exposure where globality and undifferentiatedness predominated, was followed by a phase at about 1/100th of a second, where the subjects'

representations, although still global were quite accurate. This, in turn, was followed by a third period ending at about 1/5th of a second, where accuracy is sharply reduced. Accuracy increases linearly from that point on with increased time exposures. This, of course, mirrors the form-emergence predicted by the Sander group. It is interesting to note that Brigden also found a general trend toward increased symmetry, completion, simplification, and transposition in his developmental progression. In fact, Brigden notes that 90% of the subjects' reproductions were more symmetrical than the stimulus material, overall (Brigden, 1933).

These studies, especially those from the Sander group, can be criticized methodologically on several grounds. Responses to the stimulus were either verbal or pictorial, and there were no efforts to analyze these responses in some statistical manner. In fact, experiments were reported in an anecdotal fashion. Also, the subjects themselves were involved with the philosophy of the School. And finally, there was no mention of having set up control groups to test the possibility that viewing the same picture at different exposure times might yield data different from a viewing of different pictures at the same exposure time. But, as will be seen in the 2 experimental studies to follow, even with the institution of proper controls, the demonstration of Aktualgenese is nonetheless dramatic and convincing.

Part II

Empirical Demonstrations: An Introduction

This paper has been concerned with the nature of thinking. The approach summarized throughout this paper, that thinking can be conceptualized as a multi-faceted process naturally unfolding over time, enables the social researcher to view the phenomena of his world from a frame of meaning that will eventually take him into some rather intriguing lines of research. For example, it was suggested earlier that one way of getting at this elusive nature of thinking would be to sample the products of thinking at various times in the developmental progression. In this way, knowledge of the structural organization of the organism at different stages of cognition would allow us to identify the direction toward which thinking is tending.

In the previous sections, we have discussed the techniques and results of numerous studies attempting to ascertain the precise direction of this process. For instance, percepts as well as thoughts do seem to proceed from a state of relative globality, into a more or less analytic stage, and on finally through a synthetic stage (Flavell and Draguns, 1957). If this is the normal state of progression, one can ask what happens in a situation where this natural process is actually blocked or interfered with in some way? This is a critical issue. For, once out of the controlled environment of the laboratory, man is in continual interaction with a broad range of physical and social stimuli. How does man deal with extraneous stimuli? How do they

affect his perceptual orientation to his world?

The balance of this paper describes 2 exploratory experiments on this topic. In the 1st experiment, subjects were distracted during tachistoscopic exposures to Rorschach cards. The problem explored in this experiment is, then, what happens to the type of responses given under these distracting conditions as compared to the responses given under more normal circumstances. In a 2nd experiment, the thinking process was blocked by giving some subjects instructions, which, in effect, forced them to begin thinking about their task on a genetic level which normally occurs later without first having gone through the earlier, global modes of thinking. These subjects were then tested on another task bearing a strong resemblance to the previous task, but with certain structual differences designed to illuminate the effects of this experimental manipulation.

Chapter 5

Interference: Its Effect On Perceptual Development

One microgenetic technique, that of gradually increasing tachistoscopic exposure, has been used with a number of different stimuli in order to demonstrate the Aktualgenese notions of increasing differentiation, and increasing integration over time (Flavell and Draguns, 1957). This method allows the experimenter to stop the perceptual process at various stages, enabling him to examine the ongoing perceptual organization and emotional involvement of the subject at this level of perception. Although the Rorschach was never utilized by the Sander group, there are at least two reasons why Rorschach cards can serve as useful stimulus material. First, the way a person structures a Rorschach card after unlimited exposure to it, is said to be a function of one's inner needs, one's personality. Now, if instead, restrictions are placed on access time to each card, the resulting data might also yield important personality correlates (Stein, 1949). For example, we can, in fact, argue that certain personality differences are merely reflections of cognitive operations at different genetic levels (see p.102). Secondly the Rorschach, because of its ambiguity, would aid in slowing down perceptual synthesis, thus making it a highly desirable research tool.

Stein (1949) was the first to use the Rorschach in a microgenetic setting. In one group where subjects were exposed to all 10 Rorschach cards, first, at .01 sec., then at 1.0 sec., 3.0 sec., and unlimited time, respectively, Stein found that not

only were more responses given at the longer exposure times but detail responses were more predominant at these times, also. In fact, the whole responses that were given were well-organized as compared to the crude and global responses that were elicited at the shorter exposure times. The detail response, then, develops over time. Stein also noted that the best fitting responses with respect to form were given at the fastest and slowest exposure times. Both are times when the subjects were concentrating on the global aspects of the stimulus.

A much more systematic series of studies was conducted by Friedman, Phillips, et al, at the Worchester State Hospital, using a scoring of the Rorschach based on developmental theory (Werner, 1957, P.140). They were interested in testing the Wernerian conception of pathological regression. Werner believed that regression was the "relative dominance of genetically early levels of functioning accompanied by a decreasing emphasis on the higher, more recently developed, genetic characteristics" (Phillips and Framo, 1954, P.467). These investigators, adapting their scale from Klopfer's classification scheme for coding the location of responses to the Rorschach, were able to break down the date that they had collected as either characteristic of genetically high or genetically low responses, respectively.

From the Ontogenetic data collected by Dvoretzki (in Friedman, 1952) and Hemmindinger (in Werner, 1957), a succession of 3 stages was identified: A global stage followed by an analytic stage, where the parts are distinguished, followed, in turn, by a synthesis, where the whole is reconstituted with a meaningful

utilization of the parts. Friedman used their findings in his microgenetic research with hebephrenic-catatonic schizophrenics. He found that the schizophrenic group was statistically indistinguishable from the responses of children of 3 - 5 years of age (Friedman, 1952). Taking this notion one step further, Framo (in Phillips and Framo, 1954) administered the Rorschach to normals and schizophrenics, respectively, under increasing degrees of tachistoscopic exposure. They found that at the short exposure times, the 2 groups did not differ, structurally. But, with increasing exposure, while the normal subjects were able to use the additional time to integrate their perception, the schizophrenic subjects continued to lag further behind.* From evidence relevant to processes of ontogenesis, microgenesis, and regression, Werner concludes "that perceptual processes develop and come to a halt at different levels"; the exact level dependent "on such conditions as age, experience, and complexity of stimuli, and on the normal or pathological maturity status of a person" (Werner, 1957, P.144).

Outside of the controlled environment in the psychology lab, most people are bombarded by a continuous flow of stimuli from all directions, each requiring that a certain amount of time be devoted to synthesizing it properly. Under these "distracting" conditions, regression may well be a necessary consequence of adapting to our environment. This problem can be addressed empirically be setting up artificial conditions in the laboratory.

* For a further elaboration on this topic, see Werner, 1957, P. 140-145.

In the present experiment, Rorschach cards are exposed for varying time intervals, and a distraction condition was introduced at the longer exposure times to test the notion that this induces a regression of perceptual responding. Under distraction, will subjects tend to use earlier modes of perceptual organization? Here, instead of limiting the coding of responses to location, our scoring scheme was derived from that of the Holtzman Ink Blot Test (1961, P.p. 34 - 83) in order to get a more detailed picture of what is happening.

Method

Subjects

Students in the introductory psychology classes at Kansas State University participated in the experiment as part of their course requirements. Twenty-five Subjects, 10 males and 15 females were assigned randomly to one of 5 experimental conditions, 5 to a condition.

Materials

Ink Blots - 3 cards from the standard Rorschach protocal were used as representing 3 different tendencies of perceptual synthesis. The following tendencies are described by Beck (1950, P.p. 2 - 27): Card 1 is typically perceived as a whole, being much more difficult to break apart. Card 10 is typically perceived as fragmented and therefore very difficult to integrate. Card 7 is seen as sometimes

closed and at other times in parts.

Tachistoscope - A 2 field tachistoscope, fitted with a Hunter timer, which extended the range of exposure from .001 sec. to 10 sec., was used. The distance from the eye-piece to the inkblot was 21¼ inches. The pre-exposure field was illuminated by 2 white fluorescent bulbs. The illumination was the same in the exposure field. Illumination level at the eye-piece was approximately 2.8 foot candles.

Drawing Materials - A graphite pencil or red pen was used for the reproductions of the responses on yellow paper.

Conditions

Condition I (T_1) - .05 sec. exposure to stimuli

Condition II (T_2) - .5 sec. exposure to stimuli

Condition III (T_3) - 10 sec. exposure to stimuli

Condition IV (T_4) - 10 sec. exposure to stimuli, while counting backwards by 2's

Condition V (T_5) - 10 sec. exposure to stimuli, while counting backwards by 3's.

Instructions

After the Subject was seated before the tachistoscope, he was asked, "Are you familiar with the Rorschach Ink-Blot Test", after which E continued, "You know that sometimes you can drop some ink on a sheet of paper, fold the sheet and an ink-blot is

formed. Then, if you look at the ink-blot you may see various things in it" (Stein, 1949, P.358). "This is not a personality test. I am going to show you some ink-blots by means of this device. After you have looked at it, I would like you to describe what you saw, first, in words and then by drawing a picture. Don't be concerned about your drawing. You don't have to be an artist". If, there were no further questions, E continued, "In order to familiarize yourself with your task, here is Card 4 from the Rorschach protocol. What do you see?" The Subject was given ample time to form his answer. We are now ready to begin. When I say 'ready', an ink-blot will be flashed on the screen sometime within the next 30 sec."

For Subjects working in Conditions' T_4 and T_5, the distraction was introduced with the following special instructions: "When I say 'ready', please begin counting backwards from 100 by 2's (3's). An ink-blot will be flashed on the screen within the next 30 sec." For the 2nd picture, the Subject starts from 200 and so on. "I will keep track of your accuracy in counting".

Analysis

Subjects' responses were analyzed according to the coding system suggested by Holtzman, 1961 (see Table 1). The percent agreement between 2 independent scorers was calculated separately for each category. For analysis, the data was split into 2 groups. Group I data consisted of Conditions' T_1, T_2, and T_3, as representative of the typical microgenetic experiment in which there is no distraction. Group II data consisted of the 3 10 sec.

Table 1

The Coding System Used in Categorizing Responses to Tachistoscopically Presented Rorschach Stimuli.

Category	Range	Coding of Responses: Scoring 0	1	2
Location	0-2	Concentration on whole <u>or</u> parts subordinated to whole	Concentrated equally on whole and parts	Concentration on parts
Integration	0-2	No parts distinguished i.e. global or stereotyped whole <u>or</u> parts present, but no attempt at integration	Parts present and attempt to integrate	Distinct parts subordinated to whole
Form Definiteness (from Table 4-2 of Holtzman, pp. 41-42)*	0-2	Formless <u>or</u> Stereotyped	Specifies form, but exact shape can vary considerably	Specifies the exact shape a picture must conform to.

* Holtzman's scoring system was adapted to the present experiment as follows:

Holtzman	Cohen
0	0
1,2	1
3,4	2

exposure conditions (T_3, T_4, T_5) with T_4 and T_5 representing the distraction manipulation. A 3(Conditions) X 3(Pictures) factorial design was used to test the effects of those experimental manipulations. Separate analyses were done for each of the 3 response categories within each of the two main groups.

RESULTS

The coder reliability in terms of % agreement was 88%, 95%, and 90% for Location, Integration, and Form Definiteness, respectively.

Group I Analysis

A. Exposure Time

The data plotted in Figure 1 make it clear that exposure time does make a difference in the perception of Rorschach cards. At the .05 sec., exposure, we can see that the pictures are perceived as rather stereotyped, global wholes with a shape ambiguous enough to fit almost anything. A typical response to Card 1 at this level might be, "I see a bat". As the exposure time increases, the most dramatic increase is in the transformation from wholes to details. At this level, there is little, if any, synthesizing activity with a bit more specification of form. For example, one Subject responded to Card 10 by identifying "grasshoppers and sea horses". At the 10 sec., exposure, there is again a dramatic shift in structure, away from focusing completely on fragments and toward making sense out of the picture as a whole. The picture begins to take on a definite shape, and, at the very least, there is an attempt at integrating the parts, albeit, not always so successful i.e., for Card 7, "2 elves rocking, held apart by a hinge".

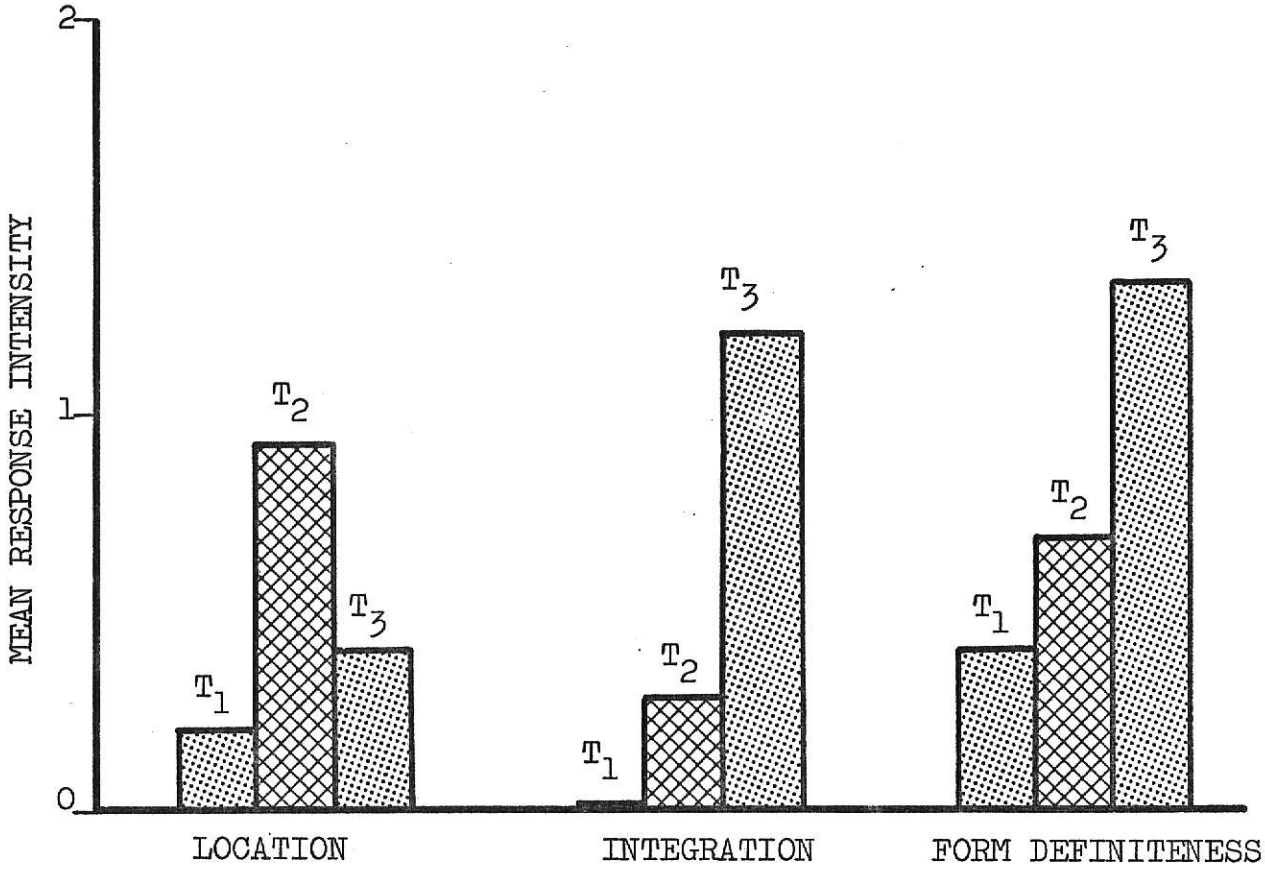
Fig. 1. Comparison of mean response intensities showing the degree to which subjects in the different exposure time groups perceived pictures in terms of their location, integration, and form definiteness.

THIS BOOK CONTAINS NUMEROUS PAGES WITH DIAGRAMS THAT ARE CROOKED COMPARED TO THE REST OF THE INFORMATION ON THE PAGE.

THIS IS AS RECEIVED FROM CUSTOMER.

Conditions

T_1= .05 sec. exposure.
T_2= .50 sec. exposure.
T_3= 10.0 sec exposure.



The 3 X 3 analysis of variance for the Group I data is summarized in Table 2. There is a strong main effect for exposure time on the Subjects' responses to Rorschach stimuli. Two further analyses, a Trend and the Newman-Keuls, were computed to get a more precise picture of what is occuring as exposure time is increased.

First, with respect to Location, the Trend Analysis shows that the quadratic (non-linear) component is quite significant ($F = 9.71$; $p < .01$). What we have, then, is an inverted U-shaped curve (refer to Figure 1), moving from a predominance of whole responses at short exposures toward detail responses dominating the middle exposure times, and finally back again toward the whole responses at the longest exposures. The Newman-Keuls, which is a statistical comparison between ordered means, shows this nonlinearity more clearly. As expected from the Trend, there is little difference between the .05 sec., and 10 sec., group means on Location responses ($F = 1.21$; ns). On the other hand, the statistical differences between the means of the .05 sec., and .5 sec., groups ($F = 4.42$; $p < .01$) and between the means of the 10 sec., and the .5 sec., groups ($F = 3.21$; $p < .1$) are quite reliable.

Turning now toward response Integration, the Trend Analysis points out an interesting thing. That is, although the linear component is, by far, the strongest ($F = 63.53$; $p < .001$), the quadratic component, again, is also significant ($F = 6.47$; $p < .05$). Referring to Figure 1, we can see that the combined

Table 2

Analysis of Variance for Group I Scores

Source	Df	SS	MS	F	P
		Location			
Time	2	4.31	2.16	5.3	<.05
$Error_b$	12	4.93	.41		
Picture	2	6.97	3.49	26.8	<.001
T X P	4	1.96	.49	3.8	<.05
$Error_w$	24	3.07	.13		
		Integration			
Time	2	11.91	5.96	35.1	<.001
$Error_b$	12	2.00	.17		
Picture	2	.84	.42	5.3	<.05
T X P	4	.49	.12	1.5	NS*
$Error_w$	24	2.00	.08		
		Form Definiteness			
Time	2	6.93	3.47	11.6	<.01
$Error_b$	12	3.60	.30		
Picture	2	2.53	1.27	8.5	<.01
T X P	4	.54	.14	.93	NS
$Error_w$	24	3.60	.15		

* Not significant

effects of these components produce something that resembles a J-shaped curve. Sampling first, from the bottom of this J, that is, the exposure times of .05 and .5, respectively, the Newman-Keuls shows that there is no statistical difference between these means ($F = 2.53$; ns). However, the 2 statistical comparisons made from the top of the J (the 10 sec. group) to the 2 groups at the bottom of the J yield strong significant differences (.05 vs 10 sec., $F = 11.29$, $p < .005$; .5 vs 10 sec., $F = 8.75$, $p < .005$).

Finally, with respect to Form Definiteness, the responses over increasing exposure time seem to follow a linear progression ($F = 21.77$; $p < .001$). Although no significant difference was obtained between the means of the .05 and .5 sec., groups ($F = 1.91$; ns), the mean differences between the .05 and 10 sec., groups ($F = 6.58$; $p < .005$), and the .5 and 10 sec., groups ($F = 4.67$; $p < .01$), respectively, are quite reliable.

B. Pictures

From Figure 2, we can also reasonably conclude that the type of picture makes a difference. Overall, while Cards 1 and 7 (P_1 and P_2) are perceived structurally similar across the different categories, Card 10 (P_3), the one most difficult to put together varies quite noticeably from the other two cards. As expected, P_3 has a higher Location response score, the lowest mean response Integration score, and is rarely given a specific form.

The analysis of variance (see Table 2) shows a strong main effect of pictures upon the 3 dependent response measures. It

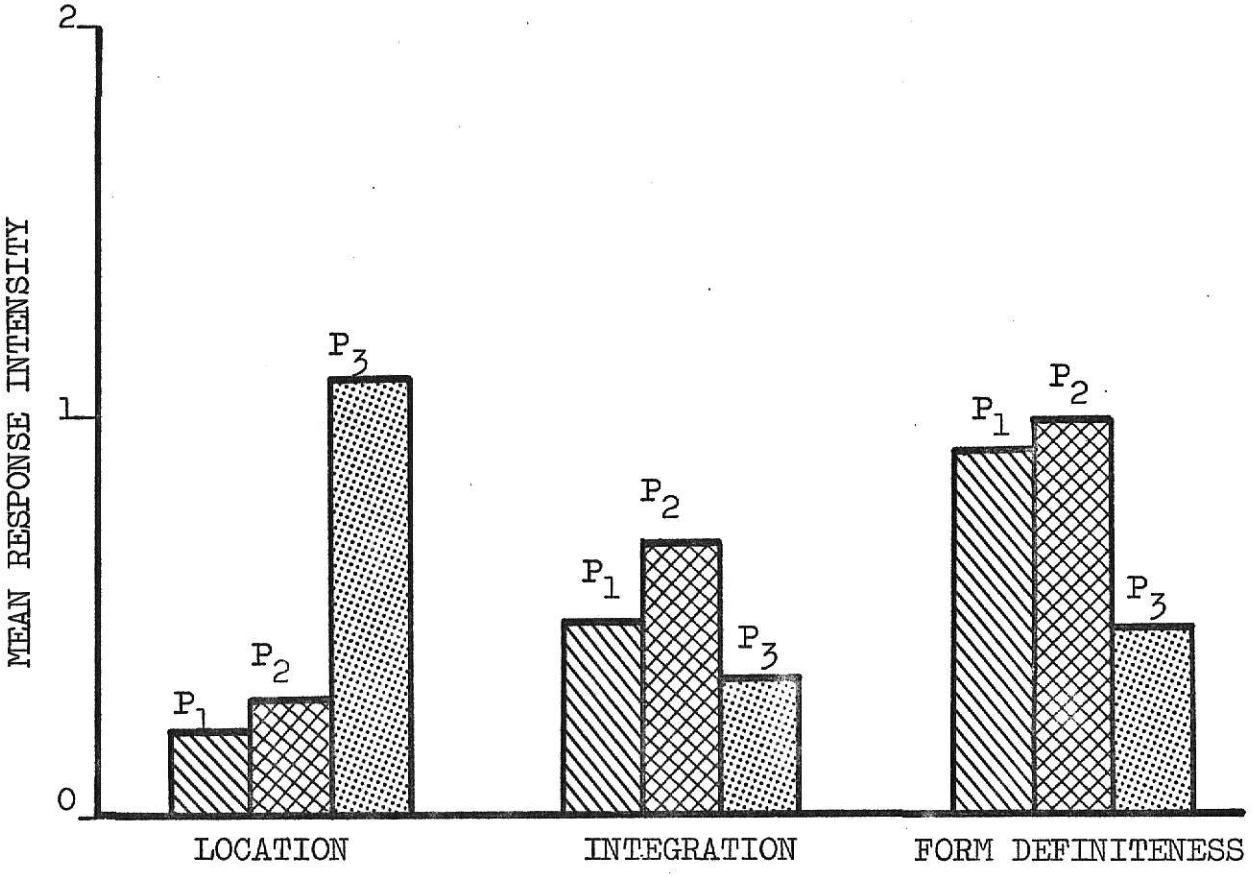
Fig. 2. Comparison of mean response intensities showing the degree to which Subjects in conditions T_1, T_2, and T_3, perceived different pictures in terms of their location, integration, and form definiteness.

Pictures

P_1= Card #1; Resistant to fragmentation.

P_2= Card #7; Amenable to both synthesis and fragmentation.

P_3= Card #10; Resistant to synthesis.



is also interesting to note that there is a significant interaction between exposure time and pictures with respect to the Location of responses.

Group II Analysis

A. Distraction

The data plotted in Figure 3 show that distraction does have a clear effect on responding to Rorschach stimuli. There is increased emphasis on parts, almost 0 Integration, and a less dramatic but still significant shift downward on the scores for Form Definiteness.

The results of the 3 X 3 analysis of variance used to test the significance of the difference among groups are summarized in Table 3. The F ratios for the effect of distraction on responding are strong and very significant.

The Newman-Keuls technique can again be used to probe the nature of the differences between group means. For Location, while the differences between the T_4 (counting backwards by 2's) and T_5 (counting backwards by 3's) groups were not significant ($F = .94$; ns), each of these means differed significantly from the no distraction condition (T_3) (T_3 vs T_4, $F = 6.26$, $p < .01$; T_3 vs T_5, $F = 7.20$, $p < .01$), respectively.

With respect to Integration, the same differences were found to hold. While there was no statistical difference between the means of the 2 distraction conditions ($F = 1.12$; ns), there are strong significant differences between T_3 and T_4 ($F = 8.64$; $p < .01$), and between T_3 and T_5 ($F = 9.77$; $p < .01$). And finally,

Fig. 3. Comparison of mean response intensities showing the degree to which Subjects in the three ten second exposure time groups (T_4 and T_5 under experimental distraction), perceived pictures in terms of their location, integration, and form definiteness.

Conditions

T_3= 10.0 sec. exposure.

T_4= 10.0 sec. exposure; Subjects count backwards by 2's.

T_5= 10.0 sec. exposure; Subjects count backwards by 3's.

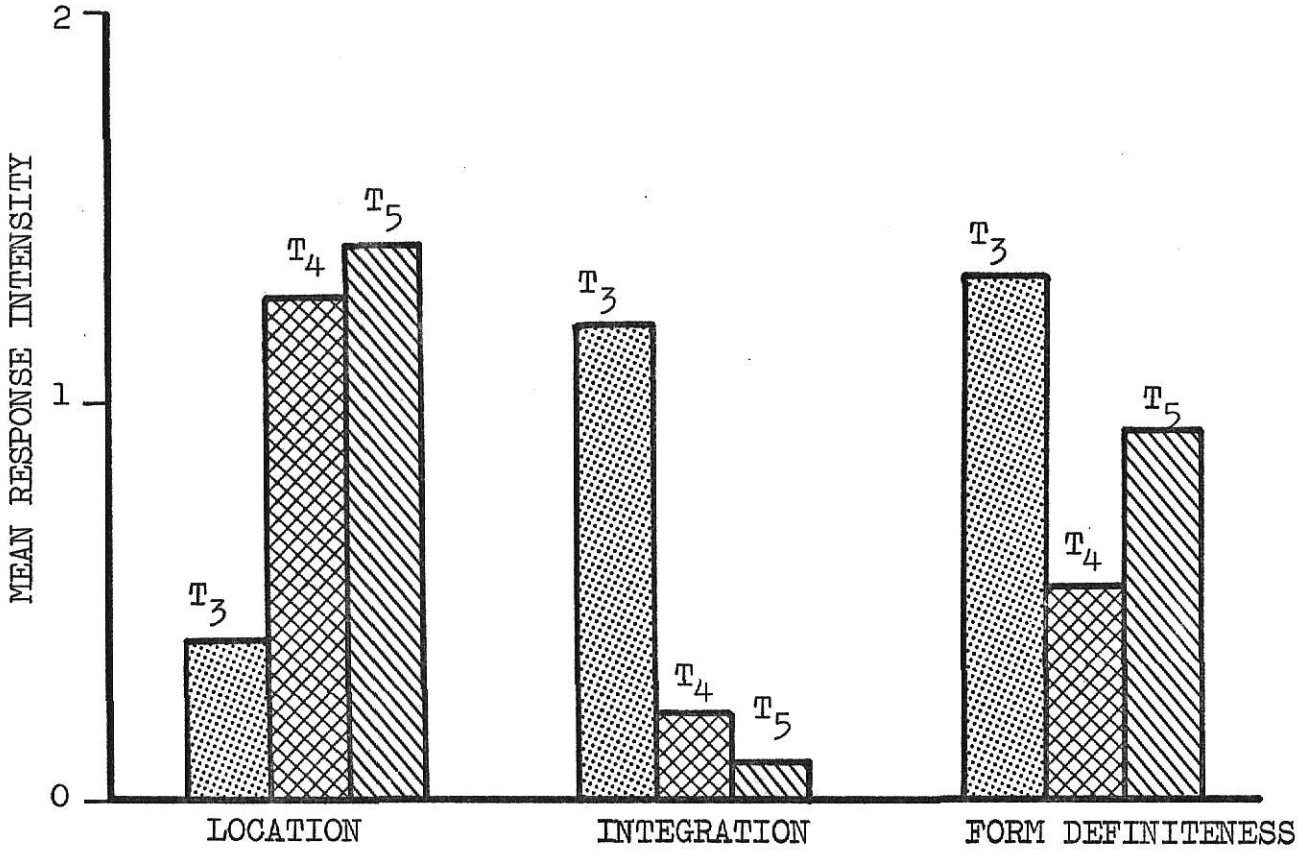


Table 3

Analysis of Variance for Group II Scores

Source	Df	SS	MS	F	P
		Location			
Distract	2	8.85	4.43	15.3	<.001
$Error_b$	12	3.46	.29		
Picture	2	6.18	3.09	18.1	<.001
D X P	4	.35	.09	.93	NS*
$Error_w$	24	4.14	.17		
		Integration			
Distract	2	11.51	5.76	28.8	<.001
$Error_b$	12	2.41	.20		
Picture	2	.57	.29	2.9	NS
D X P	4	.35	.09	.9	NS
$Error_w$	24	4.14	.17		
		Form Definiteness			
Distract	2	4.80	2.40	14.1	<.001
$Error_b$	12	2.00	.17		
Picture	2	1.60	.80	6.7	<.01
D X P	4	1.60	.40	3.3	<.05
$Error_w$	24	2.80	.12		

* Not significant

for Form Definiteness, again the identical differences were found; there were strong differences between the T_3 and T_4 means ($F = 7.55$; $p < .01$) and between T_3 and T_5 ($F = 3.77$; $p < .05$), but no significant difference was found between the means of T_4 and T_5 ($F = 3.77$; ns).

B. Pictures

From Figure 4, we can see, graphically, that the ordering effects of the cards within each category under distraction are preserved. The differences in the cards seen from Figure 4 are almost identical to the differences in the cards viewed under more normal circumstances (compare Figures' 4 and 2).

The results of the analysis of variance for pictures summarized in Table 3 show that there is a strong main effect of the type of picture upon the responses to Rorschach cards, in terms of Location and Form Definiteness, while the type of picture does not seem to make a difference with respect to Integrative responses. Only when responses were coded for Form is there any interaction between distraction and pictures.

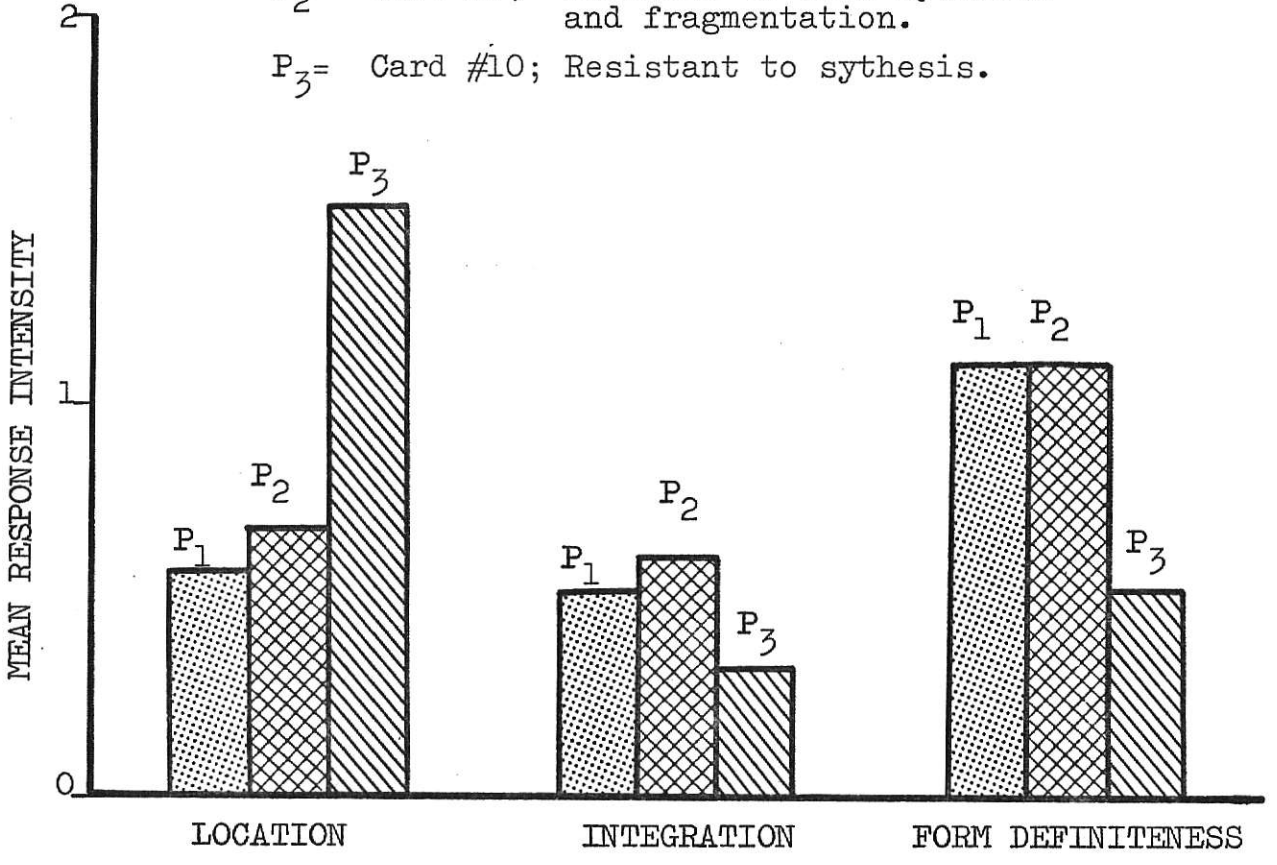
Fig. 4. Comparison of mean response intensities showing the degree to which Subjects in experimental distraction conditions, (T_4 and T_5) perceived different pictures in terms of their location, integration, and form definiteness.

Pictures

P_1= Card #1; Resistant to fragmentation.

P_2= Card #7; Amenable to both sythesis and fragmentation.

P_3= Card #10; Resistant to sythesis.



DISCUSSION

The present experiment does certainly confirm the Ganzheitpsychologie notion of increasing differentiation and hierarchic integration over time. From the data collected in this experiment, we can suggest that there are stages in the development of thinking where a particular mode of processing plays a more critical role. In the 1st stage, although some form is being perceived by the Subject, it would appear that the main preoccupation of the perceiver is in obtaining some general intuitive notions about what the picture might be. In a 2nd stage, the Subject seems to be primarily concerned with the delineation of parts. At this point, there is not even an attempt at integration. Finally, in the latter stages, although parts are still being identified, the most noticeable shift seems to be the concern the Subject has for integration, for a construction of a stimulus that has some meaning for him.

An important point here is that the differences in the perception of a stimulus at one exposure time as compared to perception at other exposure times is not merely a reflection of information; that is, the perceptual process is not just a linear accumulation of information. The dramatic quality of the shifts on the Location and Integration responses over time suggests an alternative explanation.

These differences in the perceptual products over time more likely reflect differences in the ways the Subjects put together the information at various levels. Here, the

information input from the environment continually interacts with the inherent structuring tendencies of the organism. For example, while there is certainly more potential information available to a Subject at 10 sec., exposure than to another Subject given the .05 sec., exposure, they both may be focusing on the whole. The difference is that in the former condition, one can use the extra exposure time to begin integrating the parts, something that evidently cannot be done at the shorter exposure times. Thus, we are talking about a perceptual process that possesses both linear and nonlinear components. It is also interesting to note that in these shifts E did not notice any real emotional participation on the part of the Subjects as their "architectonic" came to realization.

That the type of picture does affect the subsequent processing of the stimulus at any level of operation suggests that in future microgenetic experiments, there should be ample pretesting of the stimuli chosen. This leads us directly to another important consideration; is the Rorschach protocol a truly representative stimulus? Can it, indeed, bring out what Sander has called, "the structuring tendencies of the soul"? Brunswik has argued that because of its inherent blurriness, its irregularity, the Rorschach is biased toward bringing out responses that favor the "realistically meaningful" side of the continuum. Whether it is actually stated or not, the Subject tested on the Rorschach is expected to come up with something that actually exists, ontotropic, rather than representations that are aesthetically meaningful, the so-called eidotropic tendencies

(Brunswik, 1956, P.134). In sum, then, future researchers in this area should be especially sensitive to the inherent biases of the stimuli they plan to use.

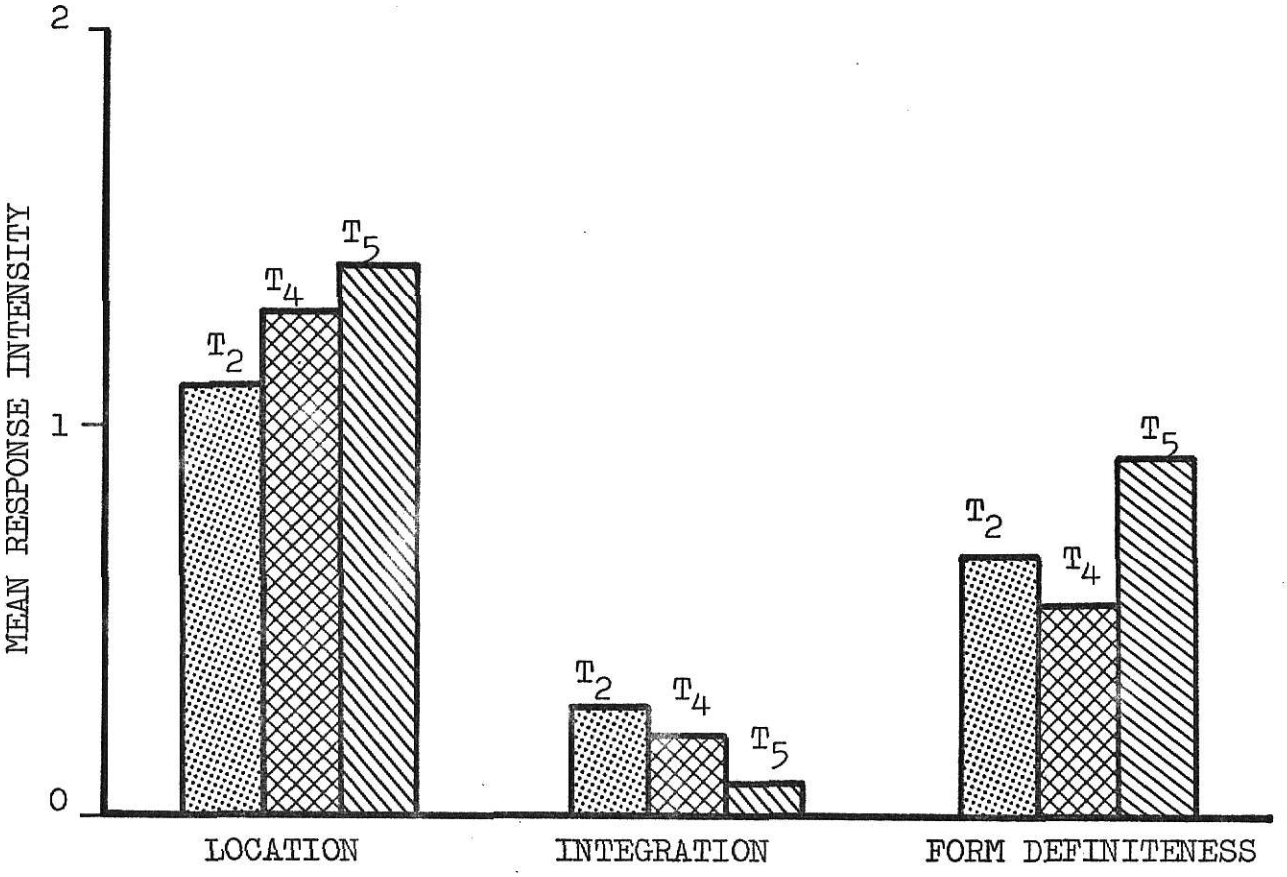
Finally, there is no doubt that distraction, even in an artificial situation such as this, does depress the influence of exposure time on the differentiation of a stimulus. But, how is distraction affecting the Subjects' responses to the Rorschach stimuli? We might get a better idea about what is actually going on by graphically superimposing the mean response intensities of the .5 sec., exposure group onto the mean responses for the 2 distraction groups (see Figure 5). It would appear that the Subjects in the distraction groups are responding quite similarly to those Subjects who were exposed to the stimuli for only .5 sec. A one-way analysis of variance for each of the 3 categories reveals that the only significant difference obtained among the groups (T_2, T_4, T_5) involved their Form Definiteness responses ($F = 5.6$; $p < .05$).

These are rather startling results! In one sense, this is not regressive behavior because there really is no evidence that these Distracted Subjects were at all capable of operating at a higher level of functioning. But, we can argue strongly that distraction effectively slows down, or even halts perceptual synthesis. So, in this sense, we may have tapped a form of regression, namely one in which there is an inability to use increasing amounts of exposure to stimuli in order to improve the perceptual adequacy and integration of that stimuli (Werner, 1957). In the present experiment, the Distracted Subjects were unable to utilize increased tachistoscopic exposure.

Fig. 5. Comparison of mean response intensities showing the degree to which subjects in the two distraction conditions (T_4, T_5), and Subjects in the 0.5 second exposure (T_2) perceived pictures in terms of location, integration, and form definiteness.

Conditions

T_2= 0.50 sec. exposure.
T_4= 10.0 sec. exposure.
T_5= 10.0 sec. exposure.



Chapter 6

Motor-Perceptual vs Conceptual: A Notion of Flexibility

Introduction

One conclusion that Werner drew from work in his comparative-developmental framework was that not only do the higher levels of thinking follow sequentially from the lower levels, but, that the activation of these primitive, intuitive modes of adaptation are necessary for the eventual emergence of the higher, more abstract forms of thought (Kaplan, 1967). That is, in order to achieve an adequate adjustment to a new or challenging situation, one must first begin by drawing on his simple, vague hunches about how he should proceed, and on his diffuse notions about what it is he must adapt to in the first place. In the process of adapting to the specific situation, man is, in fact, learning something else. He is learning to be flexible; he is learning to shift gears while he is still in motion. This flexibility is not simply built into the operating structure of high level functioning, but is a characteristic that the organism develops in the process of interacting with the environment in more complex ways.

We can clarify the meaning of flexibility by a brief discussion of what Werner calls "analogous processes" (Werner, 1948, P.214). These are processes directed toward the same goals, but that appear in different forms at different genetic levels. A good example of this is in our thinking activities. While a

baby may think about objects in terms of their ability to be grasped and rotated around in his hand, the older child can think in terms of the object's perceptual qualities, such as shape, texture, or color. Now, in contrast to these earlier modes of thinking, the adult in our culture is capable of capturing the essence of his environment in terms of a conceptual language, abstract thinking. Motor-affective, perceptual, and conceptual processes are all analogous because they each constitute a re-organization of thought patterns at different developmental levels. At the highest levels of thinking, where there is a high degree of differentiation, and where in our culture conceptualization dominates, these earlier-emergent functions play a rather sub-ordinate role.

At these levels, the organism, then, has tremendous flexibility because depending on the demands of the environment, the mode of thinking that is best suited to handle the situation is activated. That process is most effective which is best able to meet the demands of the situation.

An obvious question follows immediately: What happens when this natural order of thinking is blocked at various points in such a way that the person does not have access to certain modes of thinking? How does this, in turn, affect the person's ability to adjust to a new situation, in other words, his flexibility? There is no direct evidence in the developmental literature, but we can draw on the research of Egon Brunswik to further understand this problem.

In his studies of size-constancy, Brunswik was interested in the problem of distance estimation (Brunswik, 1956). He

juxtaposed two modes of estimating distance, the first, the intuitive-perceptual mode, the second, the analytic-conceptual mode. In one particular experiment, one group of subjects were to estimate the distance of an object using a conceptual scheme i.e., rules and mathematical formulas for computing distance, while the other group had to judge distance using just their subjective perception of the object. For our purposes, if we can ascertain the qualitative differences between the two modes, it may be possible to specify the relative effectiveness of these modes in particular circumstances.

In Brunswik's experiment, the subjects had access to only one of the two aforementioned modes of thinking. It was found that conceptualizing differs substantially from perceiving on a number of critical dimensions.

Intuitive-perceptual Mode	Analytic-conceptual Mode
1. Rapid	1. Slow
2. Multi-track	2. Single-track
3. Low Degree of Awareness	3. High Degree of Awareness
4. Imprecise	4. Precise
5. Normal Distrib. of Errors.	5. Errors Drastic

(From Hammond, 1957, P.13)

In terms of the accuracy of judged distance, while only 4 of 28 in the Perceptual group hit it precisely, 13 of 27 in the Conceptual group hit it directly on the nose. But, where the Perceptual group's errors were normally distributed around the distally correct solution, those subjects in the Conceptual group that were in error, committed rather drastic errors. Brunswik concluded that while the perceptual process proceeds with rapid

assimilation of a multitude of cues, each cue alone of limited ecological validity, this process eventually culminates in a judgement that approximates the objectively correct answer. The conceptual mode, on the other hand, is slow, relies on a particular organizing rule or set of rules of extended validity, and is usually quite accurate. But, when it is wrong, it is way off the mark (Hammond, 1957). While "perception lingers in the twilight zone of compromise,"....."one of the typical pitfalls of reasoning"..... is its tendency of "going off in the wrong direction by being right about something else" (Brunswik, 1956, P.91).

In sum, then, while the conceptual process is more accurate a greater percentage of the time, because of its inherent slowness, its one-track mindedness, it can be a dangerous operation. It can be dangerous when a conceptually biased group of subjects do not have access to alternative means of verifying the correctness of their solution i.e., via intuitive processes. That is, the earlier modes of thinking continue to mellow the pointedness of conceptual thought.

Specific Aims

Flexibility is that operation at high levels of thinking which enables one to put into gear one of a number of highly differentiated analogous processes. Brunswik's task was adevelopmental. It is the explicit purpose of this present experiment to test a developmental notion of flexibility. Learning to solve a finger-maze in a normal manner is blocked.

One group of subjects is given only a "high level" conceptual construct for solving the puzzle immediately. The 2nd group is given a motor-perceptual scheme. Then both groups are tested on a criterion maze that is similar in some ways to the training maze but different in other respects, notably with respect to its complexity. Two hypotheses are posited:

Hypothesis I. The Conceptual Group will consume more time in solving the maze than either the Motor-Perceptual Group or a Control Group running the criterion maze without previous training.

Hypothesis II. The Conceptual Group will commit more errors while negotiating the criterion maze than either the Motor-Perceptual Group or a Control Group running the maze without previous training.

In order to test these typotheses, subjects' performances were evaluated in terms of two dependent variables: 1) total time (in sec.) to run the finger-maze, and 2) errors at each choice point. Two one-way factorial designs are used to analyze the results.

Method

Subjects

Subjects were 30 students, 15 males and 15 females from the introductory classes at Kansas State University, randomly placed in one of 3 conditions.

Material

2 finger-mazes (see Figure 6)
A. training maze
B. criterion maze
Stop watch
8½" X 11" green paper for the Subjects to draw a picture of the maze

Procedure

Each Subject was seated next to a table so that he had easy access to Maze A. E stated "this is called a finger-maze. This is the starting point and this the goal box. Now, the object is to put one of your fingers at the beginning of the maze and to run it around until you can get to the end." Instructions were as follows to each group:

Group I Motor-Perceptual Condition (N= 10)

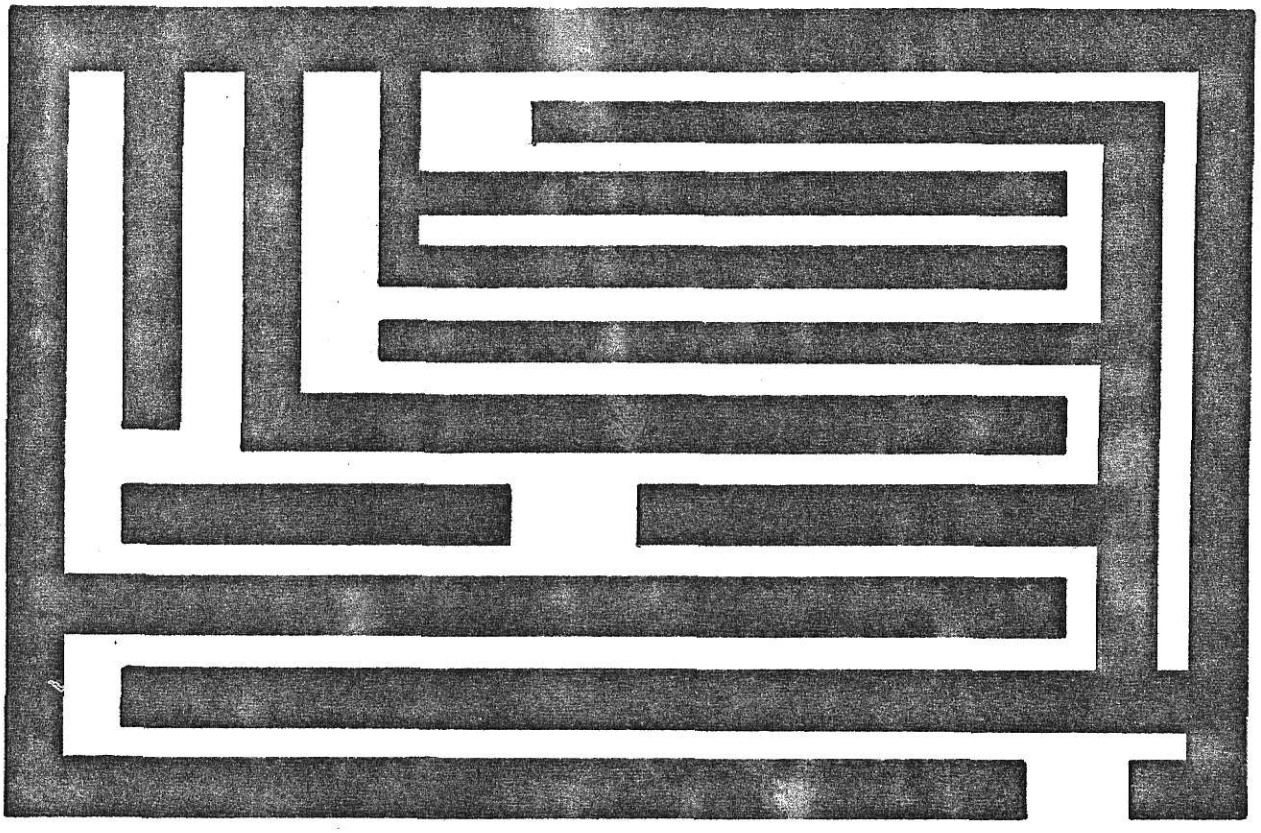
"Try to familiarize yourself with this finger-maze. You can run your finger through, if you wish, to get a feel for it. There's no need to memorize specific turns. Be flexible. How is the maze constructed? Just get a general idea of how it feels, how it all fits together."

Group II Conceptual Condition (N= 10)

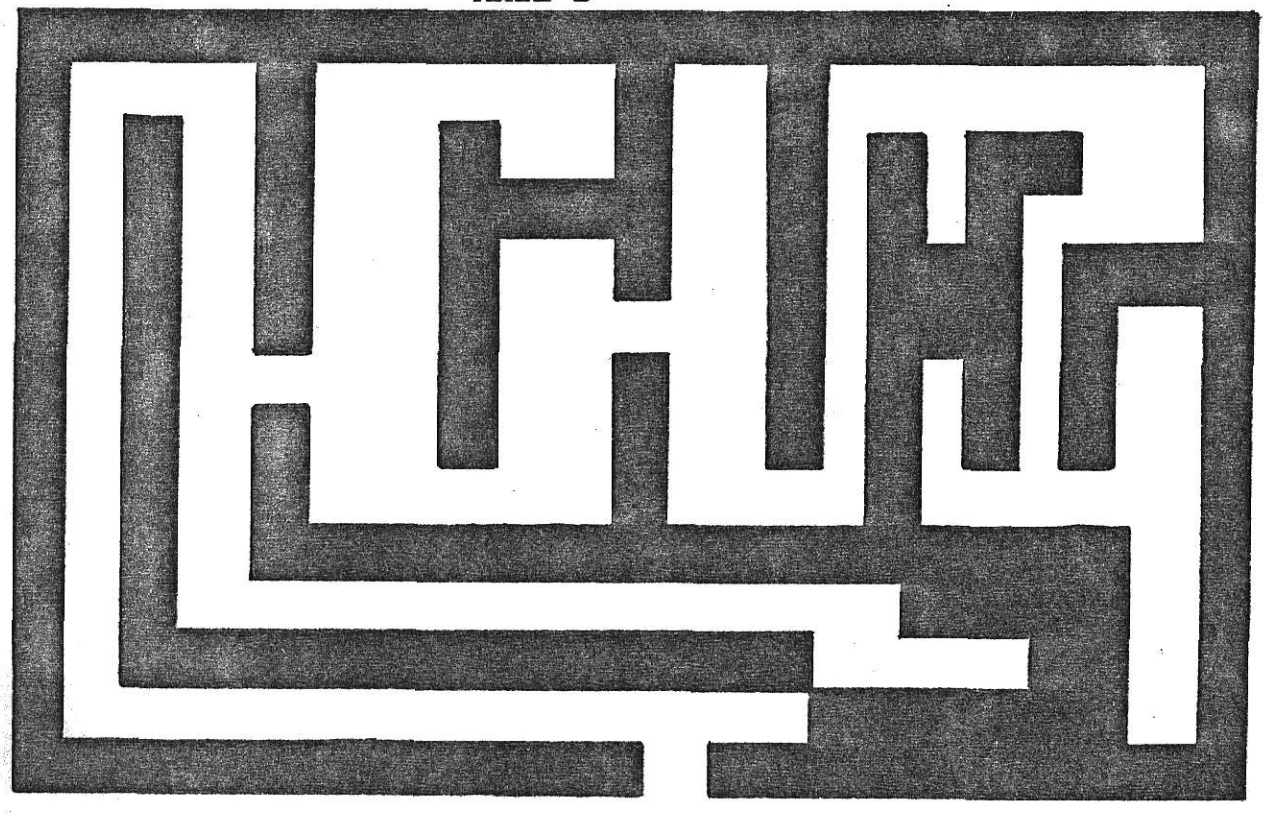
"Try to familiarize yourself with this finger maze by finding the shortest route to the goal. Try to remember exactly what turns you made. Study it. Then, try to draw the map for yourself on this piece of paper. Get to know the maze."

Fig. 6. Schematic of the Two Finger-Mazes Used in the Motor-Perceptual vs Conceptual Experiment.

MAZE A



MAZE B



Group III Control Condition (N= 10)

No training on Maze A.

Subjects in the experimental groups were given 2 minutes to familiarize themselves with the maze. Then, the following instructions were given to all Subjects in all 3 conditions: "Now, I am going to blindfold you and let you run through a finger-maze." At this point, the Subjects were blindfolded and asked to get up and spin themselves around. While they were spinning, E substituted in Maze B. When the Subjects were again seated, E continued "I'll be recording both how long it takes you and the number of errors you make in getting to the end of the maze. O.K., any questions? Let me have your finger, and I will place it somewhere at the beginning of the maze." The Subject's finger was then put at a place in Maze B, which was similar in construction to the start of Maze A.

After the Subjects ran through the maze, the blindfold was removed and each Subject was asked, "see if you can draw a map of the maze showing the correct path to the end of the maze". Subjects were then asked to describe their experiences in going through the criterion maze. All Subjects were then made aware of the purposes of the experiment and thanked for their cooperation.

Results

Time

Subjects running time in the criterion maze for the 3 groups were recorded and indicate, first of all, that the fastest mean time occurred in the Motor-Perceptual (M-P) group, 44.0 sec., followed by the Control and Conceptual groups with mean times of 76.1 sec., and 156.8 sec., respectively (see Figure 7). From Table 4, we can conclude that while 70% of the Subjects in the M-P group were negotiating the maze in 35 sec., or less, 80% of the Subjects in the Conceptual group were consuming considerably over 90 sec., to run through the same maze, results that are in line with those suggested from Hypothesis I. In fact, with

Fig. 7. Mean time in solving the maze as a function of instructional set.

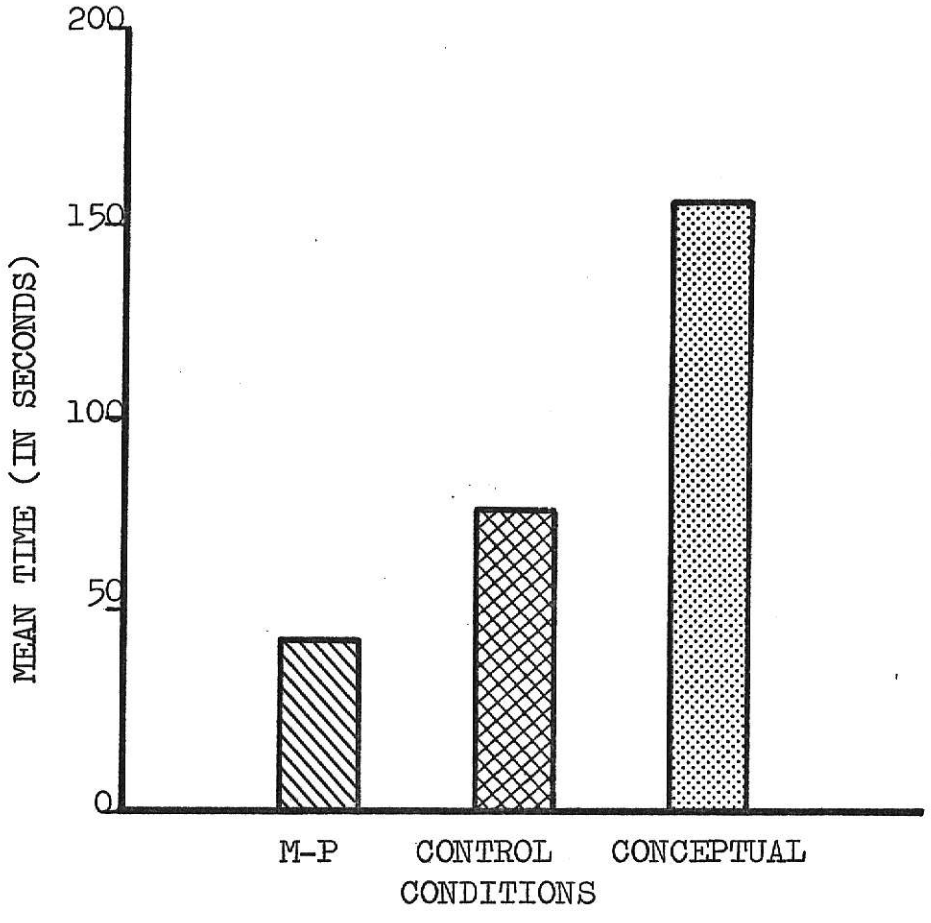

200
150
100
50
0
MEAN TIME (IN SECONDS)
M-P
CONTROL
CONCEPTUAL
CONDITIONS

Table 4

Data Showing the Time Consumed In Solving The Criterion Maze for each Subject by Group (in seconds).

Motor-Perceptual	Control	Conceptual
47	85	218
27	77	55
150	91	75
33	60	315
23	95	96
47	93	115
20	50	207
35	63	105
23	107	143
35	40	239
$\bar{X}$= 44.0	$\bar{X}$= 76.1	$\bar{X}$= 156.8

respect to group means, the M-P Subjects are about 1½ times faster than the Control group and almost 4 times quicker than the Conceptual group.

The results of a one-way analysis of variance used to test the significance of the difference among the groups are summarized in Table 5. There is a strong main effect of training conditions upon running time. In probing the nature of the difference between group means, a Newman-Keuls Test on ordered pairs of means was used (see Table 6). The M-P group approaches statistical significance when compared to the Control group. However, the Conceptual group is clearly significantly different from either the Control or M-P Subjects in elapsed time.

Errors

Subjects' errors (wrong turns) while negotiating the criterion maze were recorded and indicate, as with speed, that the M-P group made the fewest mean errors, 4.6, followed by the Control and Conceptual groups with 8.6 mean errors, and 20.2 errors, respectively (see Figure 8). Here, the Conceptual group made 2 times as many errors as the Control group and 4 times as many errors as the M-P group. From Table 7, we can see that while only 2 Subjects in the M-P group committed anything over 6 errors, 7 out of the 10 Subjects in the Control group committed 6 or more errors. In contrast to these groups, 60% of the conceptually-coached Subjects contributed 18 or more errors each in the criterion maze.

Table 5

Results of The One-Way Analysis of Variance For Time Carried Out on The Motor-Perceptual, Control, and Conceptual Groups.

Source	Df	SS	MS	F
Time	2	67555.80	33777.90	11.26*
$Error_b$	27	81020.50	3000.76	

* $p < .001$

Table 6

Newman-Keuls Test on all Ordered Pairs of Means with Respect to Time (N= 10).

Source	Df	R	F
M-P vs Control	27	2	1.85
M-P vs Conceptual	27	3	6.51*
Conceptual vs Control	27	3	4.69*

* $p < .01$

Fig. 8. Mean errors as a function of instructional set.

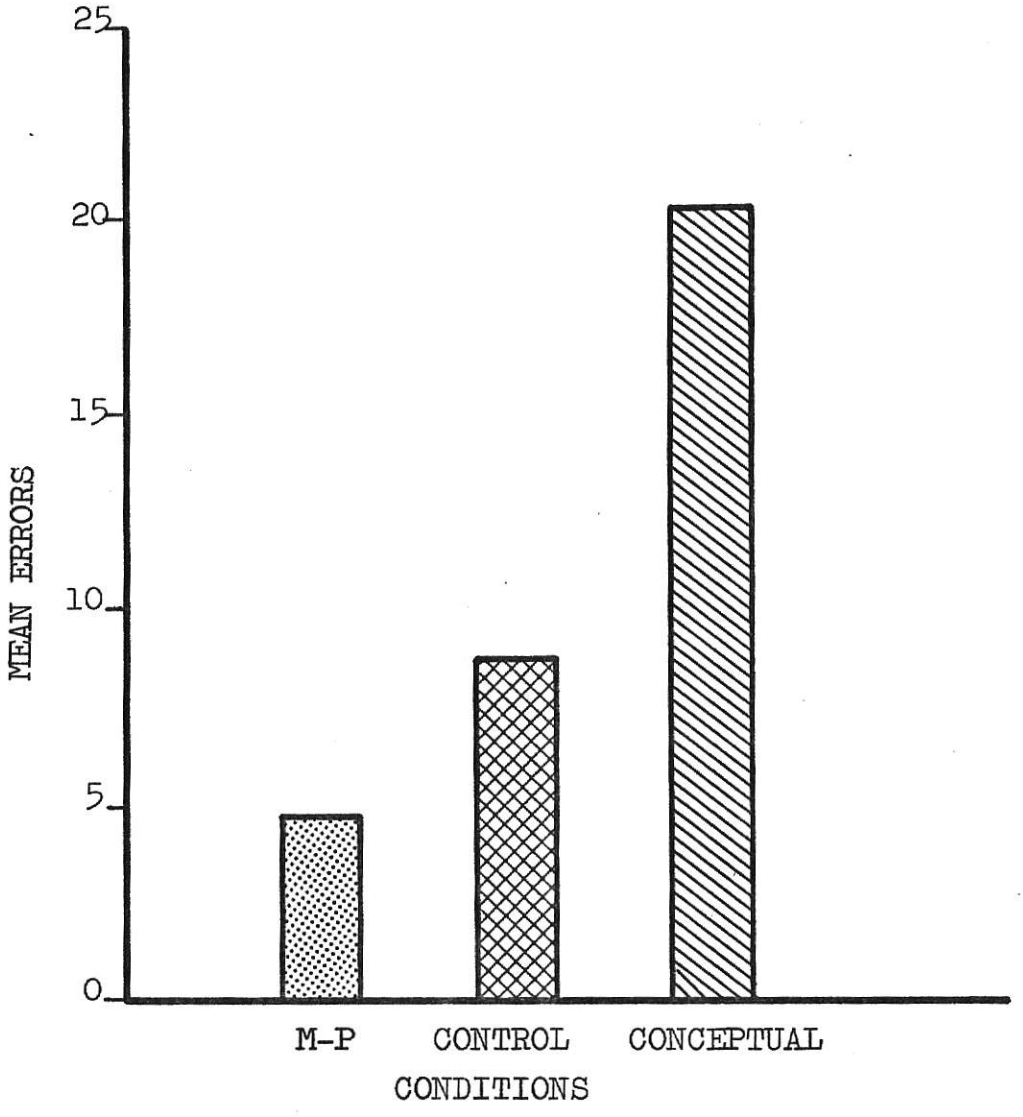

25
20
15
10
5
0
MEAN ERRORS
M-P
CONTROL
CONCEPTUAL
CONDITIONS

Table 7

Data Showing the Number of Errors Committed In Solving the Criterion Maze for each Subject by Group.

Motor-Perceptual	Control	Conceptual
2	9	25
5	12	7
11	10	11
6	5	44
2	7	9
8	10	22
1	6	27
3	6	13
3	13	18
5	7	27
$\bar{X}$= 4.6	$\bar{X}$= 8.6	$\bar{X}$= 20.2

A one-way analysis of variance was used to test for the significance of differences on errors amongst the 3 groups. The results are summarized in Table 8. This reveals a strong main effect upon errors. Further analysis with the Newman-Keuls Test for significance between means (see Table 9) shows that while the M-P group vs the Control group only approach significance, the M-P vs Conceptual and Conceptual vs Control are clearly statistically different with respect to errors.

Accuracy

In order to assess the accuracy of the Subjects' cognitive map, E counted the number of turns each Subject made on his map drawing. The t-statistic was used to test for the difference between the mean of the M-P group and the objectively correct number of turns in the criterion maze, and the mean of the Conceptual group and the objectively correct number of turns in the criterion maze, respectively. No difference was found between the mean accuracy scores for the M-P group and the actual number of turns in the criterion maze (11.38 vs 11.0; $t = .38$; $n = 8$). However, the Conceptually instructed Subjects were found to be significantly less accurate in their representations (15.0 vs 11.0; $t = 2.95$; $p < .02$; $n = 8$). As could be predicted from their time and error scores, the Conceptual group overestimated the complexity of the test maze, while the drawings of the M-P group were quite accurate.

Subjects' Observations

Although there is no statistical treatment of the Subjects'

Table 8

Results of the One-Way Analysis of Variance for Errors Carried Out on the Motor-Perceptual, Control, and Conceptual Groups.

Source	Df	SS	MS	F
Errors	2	1313.07	656.53	13.61*
$Error_b$	27	1302.40	48.24	

* $p < .001$

Table 9

Newman-Keuls Test on all Ordered Pairs of Means with Respect to Errors (N= 10).

Source	Df	R	F
M-P vs Control	27	2	1.82
M-P vs Conceptual	27	3	7.10*
Conceptual vs Control	27	3	5.28*

* $p < .01$

comments about the task, it was felt that an examination of their comments as they went through the maze might aid in clarifying the effects the instructions actually had. The predominant and almost unanimous remarks of the Subjects in the M-P group held that they felt all along that they were headed in the right direction. "I just had a feeling I was going right." In fact, 3 of the Subjects actually felt that they were being directed toward the goal ---------- "I knew where the goal box was; I seemed to sense it; I knew instinctively when I had hit the goal box". In contrast to these Subjects, not one of the Subjects in either the Control or the Conceptual conditions voiced this feeling of directedness. On the contrary, 5 of the 10 Subjects in the Conceptual group actually thought they had gone through the training maze at the end of the experiment! In fact, one particular Subject realizing, after an agonizing two minutes had elapsed, that this was not the training maze, announced to the Experimenter this discovery and proceeded to solve the maze quite rapidly.

Experimenter Observations

In general, the Subjects in the M-P group proceeded rather smoothly through the maze, the errors they did make were almost never redundant ones. Most of the Subjects in the Control group moved smoothly at times in the maze, yet at other times seemed to get stuck in one part of the maze or another. But, they were always in motion. On the other hand, those Subjects operating with the Conceptual set seemed to repeat the same error time and time again. With almost no exceptions, all of the Subjects got

hung up in the first part of the maze. Movement was choppy with continual reversals of direction.

Discussion

Experience does make a difference. But bad or inappropriate experience can be worse than none at all. As compared to the Subjects who had no previous experience with the criterion maze, those Subjects given a conceptual-analytic set on a training maze were significantly slower, and committed more errors on the criterion maze, while those Subjects given a motor-perceptual-intuitive set, although not differing statistically from the Control group, were, as a majority, faster and less error-prone.

A direct comparison of the groups with prior experience demonstrates in a rather dramatic fashion the superiority of the Motor-Perceptual group as faster, and as more accurate, both in terms of number of errors and in terms of map drawings than that of the Conceptual group. Thus, statistically speaking, the former group is easily the more flexible of the two groups.

Surely this is not enough! When it is known that exposure time to an identical external stimulus (training maze) is held constant across both conditions, how is it possible that one group comes to be more flexible in adapting to the experimental situation than the other? We can argue that there are certain qualitative observations that we can now draw on that provide clear indications of how different approaches to maze learning affect, substantially, the ensuing overt behavior of Subjects operating in such a circumstance.

In the Control group, where no overt strategy was outlined, it is evident from the way these Subjects moved along the maze that they did, indeed, have a strategy. The fact that they made errors throughout the maze attests to the supposition that, for the majority, trial and error behavior was their best strategy. For the Motor-Perceptual group, this was not a trial and error task. They sensed the possibilities that one path was better than another. And, when they were wrong, they could sense this too, and would move quickly to regain their rhythm. While the Control group Subjects responded to the pressure of getting to the end of the maze as quickly as possible using the least circuitous route, with rather continued movement throughout the maze intermingled with abrupt shifts in direction occasioned by wrong turns, the Motor-Perceptual group responded to the same overt pressure with an air of confidence. Committing relatively few errors on their way to the goal box, there is typically a smoothness, a characteristic rhythm of movement that distinguishes these Subjects from either one of the other groups.

In direct contrast, the Conceptually-coached Subjects were nervous and confused. The most salient characteristic of this group was their persistence in making redundant errors. As time elapsed and the pressure of finishing began to build, many began to panic. In point of fact, 2 of the Subjects stopped moving, their fingers frozen for several seconds while they made up their mind which way to go next. Many of the Subjects would begin talking to the Experimenter, complaining about "What's going on here?"....."I'll never finish this". And,

even as the Experimenter was asking them to have more patience, their fingers would already be speeding up darting off to another decision point. It was as if these Subjects were determined to fit this familiar yet not so familiar maze into their ready made existing schemas. They were, indeed, determined to force this criterion maze to fit their very conception of it. Even after they had solved it, many of them held firm to the belief that they had actually gone through the training maze. In other words, many of these Subjects were able to maintain their narrow focus despite this evidence to the contrary.

It is interesting to note, here, that in one microgenetic study, Gittens (1970) found that scientists formed a stable impression of a city much sooner than creative writers did. As a consequence, the writers presented a more differentiated characterization of the city. It seems a general property of conceptualization that it tends to narrow the focus of experience. This, in itself, is not detrimental, but if, as in our experiment, this narrowing down occurs before a critical time, if it tends to block the potential development of a percept or thought, it can have a disastrous effect, indeed! Extending this critical period notion still further, it would be interesting to look for times where the very same conceptual information can actively aid the subject in understanding the maze.

As Sander has pointed out, there is a natural rhythm in many of the activities that man participates in. We might note here that the people most flexible, those given the Motor-Perceptual set, are also the ones that came closest to expressing a continuous,

even rhythm of motion. Flexibility as a product of process, of development, may be fostered as one moves from the global to the differentiated in a context of free-flowing directed movement.

That learning is a directed activity seems to be suggested from the evidence in this experiment in so far as learning by trial-and-error is utilized when no other means exist. Further, for optimum learning, far from being merely a building up of a stimulus-response hierarchy, learning may begin with an intuition, a vague direction out of which the groping, the so-called trial-and-error learning may take place. In the Motor-Perceptual group, this groping takes on a pattern of smoothness and regularity. Since both the Conceptual group and the Motor-Perceptual group each had 2 minutes of exposure to the training maze, and since both groups used this time, a causal argument using this notion of proactive inhibition seems weak from its very conception. It is evident, at least in this experiment, that while interference is taking place in both conditions, it is not the fact of interference but the kind of interference that is affecting the results.

Part III

Chapter 7

The Multi-Dimensional Character of Thinking: A Conclusion

Introduction

We began this paper with the naive assumption that man's thinking nature is somehow embedded in the oftentimes elusive, striving character of the thinking process. Philosophers have traditionally dealt with thinking in a dichotomous manner, affect treated as a primitive form of thought at best, and reason representing the other more advanced form. Further, thinking has been and, as is very much evident in our own culture, is still functionally conceived as a uni-dimensional process with increasing degrees of reason fostering increased communion with reality.

Kant was amongst the first to question the validity of these simple notions. Primarily concerned with the forces that produce our experience, Kant concluded that thinking is, basically, a function of man's interaction with his environment. It might follow, then, that in order to understand our consciousness of things, one must first know something about the peculiar quality of man that ultimately determines how thinking will proceed.

Although Kant was not specifically concerned with the development of thinking, his focus on the importance of man in the thinking process naturally led to the progressive emergence, first, of a Psychology concerned with the structure of experience,

and later, of a Psychology of cognitive development i.e., Werner, Piaget. It is in this context that we wish to restate one of the major premises of this paper: Cognitions may have meaning to the extent that they are anchored in time. That is, we come to understand the nature of thinking by studying the succession of structural changes that are elaborated within the organism over a period of time. By structure, we, of course, mean those rules the organism utilizes in his processing of the environmental input.

Particularly in Werner's Theory can we begin to envision the formation of rudiments that will eventually culminate in the rapid demise of the rigidly held dichotomy between thinking and feeling. Fox example, Werner posits 3 differentiated forms of thinking, each form occupying a unique emergent-status in accordance with the developmental sequence. Werner has further stipulated that Conceptualization, as one form of thinking, is not necessarily a better, or more advanced mode of thought, only a later developed mode. In fact, in his later writings (Werner, 1957), he made it quite clear that Motor-Affective, and Perceptual processes could, under special circumstances, grow to a level on par with the differentiated and complexly integrated Conceptual mode. In sum, then, our view of the relevant evidence suggests that the traditional distinction between thinking and feeling can no longer be validly maintained either on the basis of their respective faithfulness to reality or on the basis of their differential emergence in the development of thought.

Leibnitz, on the other hand, was very much concerned with thinking as a teleological process. Monads, the basic elements

of his theory of thinking, are, indeed capable of constructing worlds of increasing complexity depending, first, on the extent to which each develops and, secondly, on the amount of energy each can invest in this constructing process. Leibnitz emphasizes not the kind, or structure of thinking, but the unfolding processes characteristic of thought evolution. Here, then, is the second major premise of this paper: Cognitions derive their meaning from where they have been and to where they are tending. That is, thinking is seen as a continuous process of increased self-growth, and self-actualization. Werner's Orthogenetic Principle of increasing differentiation, articulation, and of increasing hierarchic integration certainly encompasses these notions of continuity.

Leibnitz frees us to the extent that we become acutely sensitive to the sometimes subtle, oftentimes violent forces that move the organism along its developmental destiny. It is in this very context that Sander begins to grapple with the dynamic clashes between organism and environment. Not only is the organism striving toward a differentiated world, but, more so, toward an aesthetic, rhythmic appreciation of that world. Sander is able to postulate emotive stages of thought development. And here again, the traditional separation of thought and feeling seems inadequate except as an expedient research strategy for certain limited problems.

Sander is, thus able to assess the thinking process through the the balancing and counterbalancing of our emotions. For him, the distinction between thinking and feeling is not so much the

result of differentiation or even high level "disengagement", but a more direct reflection of our narrowness, of our inability to view the development of thinking in its natural continuity. That is, in our efforts to understand the nature of thinking, we have chopped it up, abstracted it, idealized it, all in effect detracting from its inherent continuity. In contrast, Sander's microgenetic techniques allowed him to view this continuity. Emotions bear the genesis of thoughts. Development, in this sense, is movement. One can detect this sense of movement from the mantle of emotions that are expressed as a function of time.

The Ganzheitpsychologie movement has been criticized for its neglect of appropriate controls in its experimental procedure. Indeed! It is now so clear that to the degree that these so-called proper controls have the effect of shattering the natural continuity of development, then to that extent, they shatter what meaning cognition holds for man.

Theoretical Differences: Werner-Piaget* vs Sander

The cognitive-developmental theories of Werner, Piaget, and Sander, taken together certainly present a rather systematic compelling alternative to the traditional inquiries into the nature of thinking. Philosophically, these theories share almost identical assumptions about the basic nature of man, and thus, there is much overlap in their conceptions. However, this is

* We are stressing the similarities between Piaget and Werner as a heuristic. In this paper, we are more interested in the subtle differences between their general approach and the emotive approach of Sander.

not to say that there are not profound differences amongst the theories. They differ with respect to emphasis. And, these differences between the 2 approaches are clear both with respect to content and implication.

A. Content

In terms of content, while there is, in both Werner's Orthogenetic Principle and in Piaget's invarient functions, an implicit recognition of the inherent continuity of development, the main thrust of their work has been directed toward the discontinuous aspects of development; the evolving stages of thought maturation. That is, much of their writing has dealt with a precise characterization of particular rules for processing the environmental input in the developmental sequence.

In Wernerian theory, we can distinguish each thought mode in terms of its location in an emergence-hierarchy: early..... ..... late. However, the latter is not necessarily the better. This is true, first, because the lower levels of thinking are necessary for the higher ones to be manifested. Noting that each thought level is a cognitive reorganization of previous thought structures, we are led to predict that insufficient development of earlier emergent modes of cognition may lead to a faulty development of the latter modes. For example, in the Maze experiment, forced conceptualization proved to have disastrous consequences; subjects consuming more time, committing more errors, and representing the task as more complicated than it actually was.

This higher level conceptual thinking is not necessarily the better, also, in that, as Werner has pointed out, artists, who as a function of their unique position in our society, are allowed to foster the motor-affective, and perceptual modes of thinking to a rather high level of differentiation, without first having to "disengage" feeling from reason.

The conceptual mode is not always the better for the mere fact that its operating structure is not always best suited to the demands of the task. For example, a person standing in the middle of the road in the direct path of an oncoming car, depending on the differential strength of his thought modes, has at least 2 ways of calculating the expected-time-of-arrival of the car. Estimating the distance between himself and the car, and the velocity with which it is approaching, will, provided he has pencil in hand, give him the ETA from the point of calculation. Or, he could rely on his instantaneous, less precise, normally distributed intuitive-perceptual evaluation of the present crisis.

Sander, on the other hand, deals explicitly with the direction and continuity of thought development. Using a number of techniques geared toward detailing the microgenetic process, Sander and his colleagues became alerted to the steady stream of emotions that accompanied form-emergence. To understand thinking solely on a structural level is to also remove feeling from thought construction. In this connection, emotions are not only seen as an early emergent mode of cognition (in the motor-affective sense) that gradually increases in its differentiatedness, but are also seen to be an active, dynamic expression of the intense exchange of forces which simultaneously act to

synthesize our cognitions while destroying and reconstituting them in more complex, highly integrated ways. Affect and reason are simultaneous elements of the same thought process.

B. Implication

Certainly, much of what Werner and Piaget have to say can be taken as a critical review of our entire educational system (see Hunt, 1966; Hooper, 1968; Kohlberg, 1969; Piaget, 1969). Here, we will only briefly discuss one particularly intriguing implication. Having accumulated a rather detailed schematic of the developmental process, we should now have a way of assessing the cognitive functioning of a person. The assessment can be made on two levels:

1. Mode of thought - motor-affective, perceptual, conceptual

2. Complexity of thought - diffuse ..... differentiated

Once we have obtained a general knowledge of the cognitive status of the person, training procedures most appropriate to his level of thinking can then be initiated. For example, Gilbert (1970) found that he could significantly increase the performance level of children's guesses on a picture completion test by gearing his training technique to the appropriate developmental level of the children. In one condition, he asked kindergarten children, who probably have more facility in the motor-perceptual realm, to use their fingers while tracing fragmentary line drawings. Gilbert found that these tactually-trained children correctly identified objects represented in the pictures significantly earlier than those children who did not have the training.

This cognitive-developmental approach can be applied even more broadly to the field of personality assessment. In our Chapter 5 on the Rorschach experiment, we made several references to the Wernerian concept of regression. That is, in real life situations, the nature of the environment, and in fact, our own limitations, are such that we are continually forced to distribute our attention. The stimuli which are least cognitively attended to will naturally be those which are also the least developed i,e., differentiated. Here is an approach to individual differences which considers both the nature of the man and the nature of his environment. But, the assessment itself need only be carried out on a dependent, uni-dimensional variable; the degree of differentiation. For example, in the area of person perception, Crockett and his students have found that the constructs a person uses to describe another person he intimately interacts with are more complex than with those he has less contact with (Crockett, 1965). By letting persons freely respond to stimuli around them and, then, by making an analysis of their descriptions on a genetic basis, we may be in a better position of understanding how a person functions in his own environment.

In the field of psychopathology, a flight into neurosis may, in some cases, be a reflection of one's self-esteem tied to a job or life situation that he is developmentally unequipped to handle. The cognitive clinician has knowledge not only of the present functioning level of the individual but also knows approximately what direction this process is ultimately tending toward.

Among the more interesting implications flowing from Sander's

theory is the idea that many, or even most, human activities possess a natural rhythm. Learning, may, in this sense be an intuitive grasp of the natural rhythm of formation. In stumbling about at the lower levels of thought, one learns something about how to go about solving a problem. For example, in our maze experiment, it became clear that the Subjects in the Motor-Perceptual group were actually searching for natural rhythm of activity that was appropriate to the task. These subjects stand out as much for their smooth, directed movement through the maze as for their quick solution to the puzzle. The rhythm of negotiating the maze is tuned to the solution process itself.

If there is but one force that can actively shape the very character of man's thinking, it lies within man's natural potential for flexibility in his thinking. Thinking is a continuity of directions as it is a constricted synthesis. A world can be capsulated within a rather broad, abstract categorization; or, imbued with enough vitality to construct a vision; or, it can be both simultaneously. If the meaning of our own existence is threatened, it is so by our own predilection for one-dimensional thinking. Indeed, meaning can be sought, alternatively, in the mellowed multi-dimensioned nature of man; an emerging nature that the psychology of thinking must begin to deal with.

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THINKING: A MULTI-DIMENSIONAL APPROACH

by

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The philosophical forces that have served as a foundation for a multi-dimensional approach to the nature of thinking were discussed. Particularly relevant, here, were the Continental philosophies of both Kant, for his emphasis on the process of thinking, and Leibnitz, for his emphasis on the inherent purposefulness of thought. The theoretical notions of Werner and Sander, both of the Leipzig Gestalt School, were seen as culminations of this emerging multi-dimensional philosophy of thinking.

Thinking was characterized as motor-affective, perceptual, and conceptual. The development of each of these modes was considered necessary for a truly flexible, adaptive adjustment to an environment that itself is neither static nor stable. Further, by monitoring the mantle of emotions that are expressed as thought evolves, it was argued that one could begin to understand what meaning cognitions hold for man. Multi-dimensionality is manifested in that the reasoning and feeling components of thinking are no longer separable either in theory, or in experience.

Two exploratory empirical studies were described as extrapolations from some of the ideas discussed in the thesis. The first utilized a microgenetic technique of gradually increasing the tachistoscopic exposures of Rorschach stimuli. Previous research had shown that with increasing exposure time, responses proceed from a state of relative globality into analytic stages, where the material is perceived in fragments, and finally, into a synthetic stage, where there is emphasis on articulation and

integration of parts within the context of a "whole". Using a more representative design and a more intensive scoring scheme than in previous studies, the present investigation obtained a similar stage-like development of perceptions. In addition, it was found that when subjects were distracted while viewing the Rorschach stimuli, there was a statistical regression to the less differentiated levels of thinking in their responses to the stimuli.

In a second experiment on the microgenesis of thinking, a notion of cognitive flexibility was explored. The thinking process was blocked by giving some subjects instructions, which, in effect, forced them to begin thinking about their task on a genetic level which normally occurs later without first having gone through the earlier, global modes of thinking. These subjects were then tested on another task bearing a strong resemblance to the previous task, but with certain structural differences designed to illuminate the effects of this experimental manipulation. These subjects were found to be significantly slower and less accurate than either a control group going through the criterion maze for the first time or a motor-perceptual group of subjects left free to explore the training maze on their own before being tested on the criterion maze. Although the motor-perceptual subjects did not differ significantly, from the control subjects, they were, as a majority, faster and less error-prone. It was concluded that flexibility, the ability to adapt to a variegated environment, is weakened by premature conceptualization.

It was finally concluded that to the extent that one-dimensional thinking pervades our cultural milieu, it tends to paralyze the meaning of existence for man.