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Price, Reese Edward

AN EXAMINATION OF THE DEVELOPMENT OF SOCIAL COGNITION IN RETARDED AND NONRETARDED SAMPLES

The Ohio State University

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Ph.D. 1983
AN EXAMINATION OF THE DEVELOPMENT OF SOCIAL COGNITION
IN RETARDED AND NONRETARDED SAMPLES

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of the Ohio State University

By

Reese Price, M.A.

* * * * *

The Ohio State University
1983

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ACKNOWLEDGEMENTS

The author wishes to thank his advisor, Dr. Henry Leland, who brought me into the Nisonger program and who served as guide and counselor as I advanced towards my degree in psychology. I would also like to thank Dr. John Gibbs and Dr. Donald Cavin for their assistance as members of my committee.

Appreciation is also expressed to Dr. Barbara Edmonson, who originally served to instigate the idea for this dissertation during a hospital visit I paid her.

Thanks are also due to Joe Ferrara, statistical computer consultant at the Pittsburg State University, who set up and ran my data and to Cynthia Willey and Sandye Beasley, who labored over my less than legible handwriting in order to turn out a final typewritten draft of this dissertation.

I would also like to thank my wife, Jean, who had to live with my alternating states of mania and depression during those final weeks as I pushed towards the final completion of the endeavor.

Finally, I would like to dedicate this dissertation to my parents, Reese and Ruth, without whose help and support none of this would have been possible. In closing, I would also like to extend thanks to the Social Competence Research Associates, Inc. for their gift of the $500 in support of this study.
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CHAPTER 1

EPISTEMIC POSITIONS CONSTITUTING THE FIELD OF PSYCHOLOGY

INTRODUCTION

Every dissertation needs a beginning chapter, and, of primary importance to the student writing it, an ending chapter. The beginning, or introduction, is usually a brief, succinct statement of the problem, with a quick passage into a review of literature, which is hopefully as complete as is demanded by one's committee. This is followed by an examination of one's research, results, and a discussion. This dissertation differs, however, in that the opening chapter seeks not to introduce, but to establish a context for a particular theoretical, or rather epistemological, position that currently holds great sway in psychology. This epistemological position is that of Piaget and his followers. In this chapter we will see exactly what relationship to other positions, current and not so current, the theorizing of Piaget and his followers hold, before we pass to a more in-depth look at this theory and its implications for research into mental retardation. This in turn will lead to a rationale for the study I plan to undertake.

Many have sought to define cognition, and determine how an organism comes to acquire knowledge. Indeed, since psychology came into being, as a science emerging from the realm of philosophical speculation, this question has been one of its primary concerns, and several epistemic
formulations have been advanced in order to explain cognitive development. This chapter is an examination of the field of psychology concerning the various epistemological positions that have been advanced within its confines as a science that seeks to explain the origins of the thought and/or behaviors of man.

Before we proceed, however, let me clarify the subject by seeking to answer in part the following questions: What is cognition? What are its components? What is its relationship to a term such as intelligence?

Cognition can be defined as the process of knowing, whereby we come to a recognition of the object of thought. It is the complex of operations we employ in thinking, and the resultant process that leads to our consciousness of the particular content of which our thoughts are currently constituted.

Within cognition itself there are several sub-areas that require our examination. "Sensation," which is the direct result of the present stimulation of the sense organs, provides us with the neurological datum that engenders our awareness of objects and an environment external to ourselves. "Perception," based on sensory input, becomes the awareness of the object by referring the sensation to an external object. It involves the recognition of the impinging stimuli in terms of its external causal correlate, whether it be an external object that is currently impinging on the sensory modalities, or a memory that has been retrieved from storage. Finally, within the cognitive process
proper, there is "apperception," which allows the perception of a
given object or fact "X" to be related to what is already known about
"X." This is the process that allows the current content of thought,
which is perceived, to be related to previously acquired knowledge.

The relationship of cognition and its various facets to intelli-
gence should become clear when we define intelligence as the capacity
for acquiring knowledge and understanding. We can expand this definition
and conceptualize intelligence as the ability to develop and employ
suitable cognitive strategies in order to adapt to available environ-
mental information in a maximally efficient manner (Note: by "adapt"
we mean interrelate and draw appropriate conclusions from incoming infor-
mation, resulting in an efficient action plan). Thus, we see that cog-
nition, as previously defined, is the mental operation we employ in
the process of thought, and intelligence is the efficiency with which
we develop and employ these operations, as measured by the end result
displayed in the behaviors observed by those about us.

Now that we have briefly examined cognition, let us now move on to
examine how an object of thought comes about. How do we acquire knowl-
edge via the process of learning? As we shall see, there are several
epistemologies attempting to answer the basic question of the origin
of the knowledge and/or the behaviors the human organism displays.

In a recent series of articles, by Reese and Overton (1970, 1973),
the authors have examined and delineated two operative paradigms that
they hold underlie all theories about the nature of man and his
behavioral development in present-day psychology. These two models have been labeled the organismic and mechanistic viewpoints of human functioning.

Reese and Overton maintain that all theories presuppose one of these general models according to which concepts and constructs are formulated. Further, these basic metaphysical models are incompatible, resulting in families of theories that are irreducible to theories formulated within other paradigms. Such models should be viewed as metaphorical, "as if" thinking, that represent reality, but are not mirrors of reality. They show how a theory is to be applied, what are and are not meaningful problems for investigation, and what types of methods are to be accepted.

In their articles, these models are held to be neither true nor false, but are rather more or less useful, whereas theories appearing within differing models are held to be true or false as determined by the empirical investigations dictated by the model within which they appear. Like Kuhn (1970), these authors see differences between worldviews as being irreconcilable since within models there are different meanings of words due to underlying assumptions, different truth criteria, and different perceptual worlds, as adherents to opposing models will see things in different relationships to each other.

Langer (1969) advances a similar viewpoint on the conceptual underpinnings of the science. He sets forth three models as primary: the "mechanical mirror model," which holds that the human organism develops into whatever it is made to be by its environment; the "organic lamp" model, which holds that the human organism develops to be what it makes
of itself by its own actions; and the psychoanalytic model, which is held to be separable from the organic model due to its emphasis on the irrational nature of man in opposition to the stress on the intellectual and rational aspects of human development found in such theorists as Jean Piaget in the organismic camp. This difference would appear to be more a matter of emphasis, however, as the psychoanalytic model is not held to be separable from the organismic paradigm in other than its emphasis on the irrational in man's nature.

Finally, in a restatement of Reese and Overton's original position, Baltes, Reese and Nesselroade recognized the existence of a third basic paradigm, i.e., Dialectics, where "Dialectics refers to the opposition of conflicting or contradictory principles and their resolution through emergent consequences," (1977, p. 25). Knowledge from this viewpoint is social, as it is created by activities of society, as well as by the activities engaged in by the individual. Thus, "there is a dialectical interaction between the individual's activities and society's activities and the result of the interaction is the individual's knowledge which may, however, change society's knowledge," (Baltes et al, 1977, p. 26).

As we can see from the above, several writers have been in basic agreement that the field of psychology can be carved up into two to three basic underlying models, i.e., the mechanistic, organismic, and most recently the dialectic. We shall refer to this tripartite division of psychology in our discussion of the various epistemic positions currently constituting the field.
Let us now proceed to an examination of these different paradigms and their various explanations of cognitive/behavioral development within the organism.

I THE ORGANISMIC PARADIGM

The organismic paradigm views development as coming about due to intrinsically directed change. It holds that formal cause, defined as the pattern of organization of the object, is primary in an explanation of any developmental change that occurs. Further, the notion of final cause, defined as the end towards which an object develops, is also of great import. The organism is held to mature according to an epigenetic framework, whose unfolding follows a predetermined progression through various levels or stages of development.

A primary characteristic of this model is its representation of the organism as the source of acts rather than as a collection of acts initiated by external peripheral forces; ...change is accepted as given. This means that change is not itself explainable by efficient material cause; for while efficient causes may inhibit or facilitate change it is formal, rather than efficient cause that is basic (Reese and Overton 1973, p. 172).

The organism is seen as intrinsically active in a Leibnitzean sense, and qualitative change is seen as real and primary; for the organism is held to be a function of changes in structural configuration, resulting in the position that the whole is more than the sum of its parts. Thus man is seen as an organized entity, "a configuration of parts which gain their meaning, their function, from the whole within which they are embedded," (Reese and Overton, 1970, p. 173).
Change in this model is therefore given, and represents a basic change in the configuration of the whole. At each new level, new properties emerge that are irreducible to what has gone before. Formal cause, i.e., structure, leads to behavior due to the final cause as goal. Causation is seen as reciprocal, and linear causality is dismissed as insufficient for an explanation of an organism's behavior. Inquiry within the model is directed toward discovering principles of organization, explaining relationships between wholes and parts, structures and functions, rather than seeking to explain them in terms of simple functions. The epistemological position that arises from this emphasis on inherent structure is constructivism, for the organism can know the world only through the structures that mediate its behavior.

In examining the organismic position in more depth, one finds a great deal of diversity within the "family of theories" that can be classified as lying within its definitional boundaries. The viewpoints within the paradigm constitute four distinctive positions: (A) Leibnitzean, which dismisses efficient or external causality as an epiphenomenon that serves no explanatory function whatever; (B) Maturationalism, of which Gesell is a proponent, which sees the role of efficient or external causality as no more than either the hindering or enhancing of a predetermined maturational unfolding; (C) The Cartesian position, which holds that although both structure and content of cognition and/or behavior are innate, efficient cause external to the organism is usually a necessary condition for its actualization; (D) The Kantian position, which holds that there are innate universal
structuring elements that are either inset at birth or unfold along a developmental progression of stages. There is a clear separation, however, between form or structure as innate, and the content found in a particular experience. The latter of the two can occur only as a result of the external environment impinging on the organism, since the external environment serves as a filler for the internal structuring agent, resulting in an interactive construction of experience.

All of the above positions are rationalistic, as there is an adherence to the notion that at least some important facet of the acquisition of knowledge exists prior to experience. In other words, any explanation of human cognition according to the organismic model will have to take into account the inherent organizational structure of the organism in question. Yet as we shall see, there is a marked difference in exactly how we are to typify the role of the external environment in the following equation: cognitive experience = an interaction between the inherent structures of the organism and the external environment. With this in mind, let us turn to the first of the four listed positions.

The Leibnitzean Viewpoint

In their articles, Reese and Overton (1970, 1973) typify the theories within the organismic tradition as Leibnitzean in tenor, since Leibnitz held that the essence of both mind and substance was intrinsically directed activity. Leibnitz, (1930) rejected the notion of efficent cause, while formulating a philosophical position that
posited a world of individually self-contained monads, whose development unfolded according to a predetermined program. Formal cause was central, and efficient cause external to the monad was seen as illusionary. Monadal development was held to be completely self-contained. Cause and effect that appeared to be external to the monad were seen as arising due to a parallelism in the unfolding of the monad's preformed programs, whose synchrony was assured by God. Thus, despite the fact that material things appear to act according to fixed and ascertainable laws such as cause and effect, and although we are entitled in ordinary language to speak of them as acting on one another according to mechanical laws, in actuality all of these activities are internally produced and are independent from one another, as they are part of a harmonious system pre-established by God.

Within the organismic position as constituted in present-day psychology, one would be somewhat hard-pressed to find a true Leibnitzean. No one is quite willing to dismiss the notion that factors external to the organism play some role in the course of its development. However, Reese and Overton (1970) are quite correct in their assertion that efficient causality has come to play a secondary role in various formulations within the organismic camp. With this in mind, let us now turn to the second position, which is most closely allied with that of Leibnitz in the organismic tradition.

The Maturational Viewpoint

This viewpoint considers maturation to be a process of continuing organization where:
The ground plan of this pervasive total pattern is laid down by genes with their remarkable capacity to propagate themselves and to reorganize the surrounding molecules. The sum total of the gene effects is manifested in the hidden mechanism of maturation (Gesell 1928, p. 64).

Gesell bases his developmental viewpoint on the basis of a perceived quasi-exclusive role of maturation, where development activity is seen to occur in a Leibnitzian fashion, as there is "a continuous transition from one state to another as it (the organism) produces these states out of itself in increasing succession," (Cassier 1951, p. 29). In opposition to the Leibnitzian position, however, there is a recognition of efficient cause, constituting a factor exterior to the organism that, while it is not a necessary condition for eliciting development, can facilitate or inhibit development while adding nothing to its predetermined course, form or organization.

For Gesell the organism is a self-initiated action system, whose developmental course is governed by the genetics it has inherited. The organism will learn only what it is developmentally ready to learn, as "the heredity endowment of the individual will play the primary role in shaping his or her overall pattern and style of growth," since "genes are responsible for the basic development trends of the species traits and of an endless variety of familial traits of individual deviations," (Gesell 1928, p. 71). The deepest determiners of development displayed became biochemical, metabolic, and physiological, unfolding according to intrinsically determined maturational guidelines. The
external environment is neither a necessary condition for elicitation, nor an additive factor, although it can hinder or facilitate the maturational unfolding.

The Cartesian Viewpoint

The third position of import within the organismic framework is decidedly Cartesian in flavor. Descartes (1951) sets forth the notion that our clear and distinct ideas of nature are innate, as is our knowledge of the universal and certain laws of physics, etc. They are not derived from sense experience, for this gives us only particulars, not universals. The role of experience, or efficient causality, is that it furnishes the conditions whereby the mind comes to a realization of these ideas, serving to actualize these innate potentialities. Descartes (1972) attempts to explicate how this comes about via a template matching system, whereby a representation of the external environment projected onto the pineal gland elicits the actualization through matching of an innately derived idea. The important fact of this system, however, is that epistemologically it holds that both the structure and content of our ideas are innate and that the role of efficient causality is that of elicitation of these ideas. It serves as a necessary, but not sufficient, condition for their occurrence. Thus the development of the organism's cognitive potentials consists of elicitation of innate potentials by the external environment. The environment adds nothing to cognitive structure or content, which are both innate and internal to the organism.
Within current psychological theory, a similar position in form has arisen with the work of such ethologists as Lorenz (1958, 1965, 1966), Tinberger (1951, 1963), Hess (1970), among others. They conceptualize a genetically preprogrammed nervous system which consists of inherent structures (fixed action patterns), defined as genetically programmed sequences of coordinated motor actions. These are both species specific, and elicited by specific stimuli in the environment, i.e., sign stimuli. The animal performs these coordinated actions without prior learning (Hess, 1970). Lorenz holds that built into the genotype of the organism is a "...limited range of possible forms in which an identical genetic blueprint can find its expression in phenogeny," (1965, p. 1). Thus, certain behaviors are preformed and are unavailable to environmental influence in terms of their form or content, although the environment usually serves as a necessary condition for their occurrence. Which is to say that "certain innate nervous system structures just come with the innate ability to select out certain stimuli from the environment; these are the stimuli that elicit (bring forth) the built in (preformed) functional component of the structure that is the response," (Lerner, 1971, p. 100). Thus, according to this theoretical position, behavioral development occurs due to an interaction between the organism and its environment, where the environment serves as a necessary condition for the elicitation of innately inset behavioral patterns.
The Kantian Viewpoint

Let us now continue with our examination of theoretical positions within the organismic family by turning to those who are of a like form with the epistemic position first set forth by Immanuel Kant (1933, 1953).

In reaction to the empiricism that led Hume to reject the notion of necessity in the relationships between cause and effect due to their inductively derived nature, Kant "awoke from his dogmatic slumbers." In so doing, he founded a new form of rationalism based on the premise that since, as proved by Hume, experience cannot yield us universality and necessity in such matters as causation, such knowledge must not arise from experience. This led Kant to advance the notion that not only is there knowledge that is synthetic a posteriori (derived from experience) and analytic a priori (tautologically true due to definition and thus divorced from experiential confirmation), but there must also be a third form of knowledge, i.e., synthetic a priori (knowledge that is logically prior to experience but which is nonetheless derived from experience).

The line of reasoning implicit in the establishment of the category of synthetic a priori knowledge is fairly straightforward. We have a recognition of the necessity and universality of certain occurrences in and facets of our environment. This knowledge cannot arise from experience, since experience can only give us particular instances; for example, the fact that a given set of conditions A cause the occurrence of B. Experience can never give us the truth of the statement that
the conditions constituting A will result in the occurrence of B in the course of future events, as there can be no certitude in inductive knowledge. Yet when these facts are pointed out in experience, we see that what is true of the particular instance must be true of all such instances, for we see its inherent necessity. The reason this is so is that, according to Kant, we construct our world of experience through the vehicle of innately derived categories which serve to structure the world of experiential phenomena.

Our recognition of these categories and/or forms of sensation is not, however, prior to experience in order of time. It is only prior to experience logically, since categorization is necessary but not a sufficient condition for our experience. In other words, Kant's Forms of Sensation, i.e., space and time; and categories, i.e., cause and effect, substance, etc.; are spontaneous products of the perceiving mind that require contact with the external environment in order for our cognizance of them. They are the structuring element whose particular content, as an object of cognition, is derived from an interaction between the organism and the external environment. Hence Kant's maxim that "thoughts without content are empty, intuitions without concepts are blind," (Kant, 1933, p. 18) meaning that cognitive organizational elements without sensation will remain unactualized and unperceived, and sensations without inherent cognitive organization will remain meaningless. These two faculties are seen as being unable to exchange their functions as "the understanding is incapable of intuiting and the senses are incapable of thinking. It is only from the united cooperation of the two that knowledge can arise," (Kant, 1933, p. 18).
Kantianism rejects both the empiricism of Hume, who felt that knowledge was totally derived from the external environment, and the rationalism of Descartes and Leibnitz, who placed both the organization and content of knowledge internal to the organism. Kant, and herein lay his genius, divorces structure from particular content, and in so doing places the universal organizational elements necessary to experience within the organism, while placing the content necessary to any particular experience within the external environment. (It is interesting that the logical outcome of all this is that reality beyond our perception of it is unknowable, as all we can know is our particular construction of it. We shall move to Hegel's objections and his resultant dialectical epistemology shortly, but first let us look at some Kantian positions within present-day psychology.)

As we have seen, the basic tenet of Kantianism is that the world as external to the observer is organized according to the structuring principals inherent to the individual. One may hold that these structuring elements are innate, or one may hold that they develop, varying in form and/or complexity as a function of time and maturational processes.

The first of the above two options is to be found in Chomsky's theory about how language develops. Chomsky (1957) holds that certain organizing principals inherent to the mind provide invariant structures that are the preconditions for linguistic experience. He proposes that all human languages have deep-seated properties of organization and structure, and that these linguistic universal structuring elements should be viewed as part of an innate mental endowment:
If the grammers of natural languages are not only intricate and abstract but also very restricted in their variety particularly at deepest levels, it becomes necessary to challenge the widespread assumption that these systems are "learned" in some significant sense of the term. It is perfectly possible that a particular grammar is acquired by differentiation of a fixed innate scheme rather than by slow growth of new items, patterns, or associations (Chomsky 1957, p. 19).

Chomsky posits an invariant innate scheme and general features of a transformational system within whose structural elements a rational language can be created. Linguistic function is thus explained in terms of a universal innate organizational element peculiar to the human organism, where the particular content of the language displayed will be dependent on the linguistic community the individual is born into.

Turning aside from the innate Kantianism of Chomsky, we can now turn to the constructive Kantianism of Piaget, who, despite his opposition to Chomsky's model (Piaget, 1970), is also interpretable as being in the Kantian vein as to his epistemic proclivities.

Furth (1973) notes that objectivity, according to Piaget, is not found in the outside world; rather, it is the product of a common species-wide subjective contribution in contact with the external environment. In this Piaget is formally in agreement with Chomsky, but where Chomsky posits an innate organizational structure as the formal cause of language, Piaget views linguistic organization as a construction that is secondary to a cognitive logical mathematical structuring, which is constructed along maturationally derived lines due to the final causation inherent in his notion of equilibrium.
In his theory, Piaget places great insistence on the primacy of internal regulatory mechanisms of development. According to Riegel (1975, 1977), the Piagetian framework pays little attention to social interactions, since development is brought about by inner cognitive leaps, which Riegel holds are inadequately explained by the notion of equilibrium and disequilibrium. The environment provides little else than necessary material for the employment of the child's invariant cognitive operations, once this development due to maturational factors is realized. Under this interpretation of Piaget, content is assimilated to an invariant logical system. Accommodation, once the logical structure is set, does not involve the structure itself, but is rather a realignment of the resultant content, the logic of which is not derived from external sources. Thus, aside from the decidedly dialectical nature of the interplay between assimilation and accommodation during the period of sensori-motor development, it appears that after this period, accommodation occurs more and more with regard to constituent elements, i.e., content within the cognitive system, and less and less with regard to the organizational properties of the system. The organizational structures' posited logic becomes increasingly divorced from the interplay between the organism and the environment. Rather, the environment becomes increasingly structured according to biologically inherent structures, while constituted knowledge is accommodated in light of ongoing experience within the logistics of the overriding structure.

The above is only an interpretation, and one can of course question its veracity. One can still advance the notion that Piaget's constructivism is completely dialectical in the interplay between
internal and external factors. Resultant logical structures can be seen as constructed via an interaction between the organism and the environment in a Hegelian fashion, where an ontological status as well as an epistemic one is given to the logical operations found in later stages. The failure to typify external factors in their construction could then be seen more as a sin of omission rather than as a commitment to the above interpretation, where one reads Piaget as saying that experience with the external environment is only a necessary condition in so far as it is needed to actualize a maturationally based invariant structure. Piaget seems, however, to openly choose the latter of these options in his article, "Intellectual Evolution from Adolescence to Adulthood," (1972). In this article, Piaget specifically rejects the notion that "the formation of operations requires a favorable environment...that the social environment and acquired experience provide the subject with the cognitive nourishment and intellectual stimulation necessary for such a construction," (Piaget, 1972, p. 8). Piaget holds that all normal subjects will attain all stages in an invariant sequence, where the stage of formed operations will be utilized in a different manner according to the experiences they have in their environment. Thus, Piaget writes that "one of the essential characteristics for formal thought appears to us to be the independence of its form from its reality content," (Piaget, 1972, p. 10). In so stating, it would appear that Piaget had definitely posited an invariant structuring element, whose basis of development is maturational, and whose actualization but not formulation is based on interaction with the external environment.
In form, then, Piaget's notion would be quite similar to that found in the psychoanalytic tradition where the nature of the person varies with the maturational stage of his psychosexual development. Despite the difference of emphasis in the psychoanalytic tradition, where the affective and irrational rather than the intellectual and rational are fixated upon, both traditions hold that the world the individual experiences is organized according to inherent organizing principals, logical in the sense of Piaget, illogical and fundamentally sexual in the case of Freud, that progress in their development according to fixed maturational guidelines. Both hold that knowledge in Rapaport's words, "...is the product of our minds' methods of organizing stimulation into experience and our reflecting upon this experience and further organizing it into more global units," (Rapaport, 1966, p. 199).

II THE DIALECTICAL PARADIGM

Dialectics can be viewed both as a mode of reasoning or investigation and as a descriptively true theory about the world. It considers things both in their interconnections with each other, and as dynamically changing entities, where change takes place through the conflict and resolution of opposites.

The dialectical position is much in accord with the organismic tradition examined earlier. It also posits an intrinsically active organism, but it rejects any notion of invariant organizational or formal elements as intrinsic to the organism. Rather, there is an emphasis on change brought about by dynamic interaction between the organism and its environment, where there is an ongoing "opposition
of conflicting or contradictory principles and their resolution through emergent consequences," (Baltes et al., 1977, p. 25). In point of fact, the dialectical position stresses the contradictory process whereby a concept passes over into and is preserved and contained by its opposite. In Riegel's (1975) words, this position moves from a consideration of either extrinsic or intrinsic factors contributing to developmental change in isolation, to a consideration of the complex interactions of both. There is no emphasis placed on stabilizing structures that serve as invariant structuring elements of experience; rather, change in both structure and content of the organism is continuous due to the ongoing interplay between the organism and its environment.

Development consists rather in continuous changes...
Asynchronies and contracts are the basis for developmental progression.... Developmental leaps are brought about by discordance, asynchrony, or conflict between events.... Stable plateaus of balance or tranquility are the exceptions. As soon as developmental task or problem is completed and a state of equilibrium is attained, new questions and doubts arise within the individual (Riegel, 1974, p. 62).

Within the dialectical position as currently constituted, two epistemic positions of note can be delineated. These are the positions set forth by Hegel and his followers, and by those who operate within the Marxist tradition. It is to the examination of the first of these epistemic viewpoints that we now turn.

The Hegelian Viewpoint

The Kantian framework does not view categories or inherent structuring elements as objectively real entities. They are not ontological principles of being, but epistemological principles of knowing. For
Kant they were the logical necessity for coherent representation of the world, and by their structuring of the world, they allowed such sensuous universals as "red," "horse," etc., to be derived from experience. Hegel's objection to Kant's viewpoint was that Kant granted the categories no ontological status. This results in an unbridgable gap between what is known by the knower (a constructed appearance) and the actual state of the world (the InItself, or reality). Hegel (1967) discards Kant's viewpoint. Structuring elements are given objective ontological status, and as such they are held to be existent separate from the mind of the observer. Hegelian philosophy rejects the schism between the knower and the known, as categories of the knower are held to be inherent in the known and vice versa. The categories for Hegel are both a part of our consciousness, and objective entities as part of the world. Both are one in a Monistic absolute, wherein all contradiction can be resolved via the dialectical method.

The dialectical method revolves around the logical contradiction, "A = not A." Western philosophy emphasizes the fact that "A" is not "not A." In Eastern philosophy the contradiction is disputed on the doctrine that only the One is, and the world of differences is illusion, thus, "A = A." According to Hegel, each identity contains its opposite. Understanding, for instance, holds that two categories are either the same, i.e., there is no difference between them, or different, in which case they are not identical. Reason, however, using the dialectical method, holds that they are both identical and distinct. For instance, Being, divested of superfluous adjectives, is actually Nothing, for both are the same vacancy. Yet how can a thing be both be and not be?
The answer is, "When it becomes," and the category of Becoming therefore resolves the contradiction. Thus results the triactic dialectical structure of thesis, its contradictory antithesis, and synthesis, where a third and more inclusive synthetic category is formulated that resolves the apparent contradiction. This in turn becomes a new thesis, beginning a new triad, until finally a category is formulated that is all-inclusive, giving rise to no future contradictions.

Cognitive structures thereby continually give way and are reformulated due to constructive confrontations in which discordance and contradictions are generated, which are in turn generated by the interdependent mutual interaction of the individual with his environment.

The dialectical method allows for the passage of a thing into its opposite. Through reasoning, we are able to break down the absolute distinctions set up by the understanding. Contradictions are only apparent, not real, for "A" contains "not A," and contradictions only seemingly exist where we have not as yet seen the whole truth about the world.

The dialectic of Hegel has been carried over into the writings of Riegel (1972, 1973, 1975, 1977). The Riegelian system rejects the notion of invariant structure that is innately or maturationally determined. Rather, in keeping with Hegel's granting of ontological status to categories of knowledge, the development of knowledge and/or cognition is seen as a complex interaction of four separate yet intertwined dimensions: the inner biological, the individual psychological, the cultural sociological, and the outer physical. Development is
"...firmly based on the interdependent, mutually influencing interactions among these four dimensions," (Reigel, 1975, p. 51). Contradiction and discord are emphasized, and structural plateaus, where equilibrium is achieved, are held to be an exception of secondary importance. Thinking, in the dialectical sense of the word, is defined as "...the process of transforming contradictory experience into momentary stable structures," (Riegel, 1975, p. 51). These structures, however, for Riegel are only the products of thought. They do not represent the dialectical nature of thought itself which is constantly seeking to formulate new synthesis, enabling it to overcome the contradictions inherent in its interactions with the world.

Riegel (1977) adheres closely to the Hegelian tack, as he holds that the materialism inherent in Marxism deemphasizes the organism in order to focus on the ascendency of economic factors in order to explain the course of human development. Let us now turn to the material dialecticians to see wherein this difference lies.

The Marxist Viewpoint

Marx, in opposition to Hegel, rejects any ontological status for mind, regarding it as simply matter that thinks, having no objective truth aside from what is realized in practice. Man's special capacity is his creative intelligence, in opposition to an animal's, whose activities are mere execution of innately given instinct. Man's activities are governed by mentally structured purposes or plans. Man is intrinsically active and has not only the capacity to create, but the need to.
In his book, *Capital*, Marx (1955) points out that man's ultimate nature is formed by the societal conditions in which he finds himself. The modification of man's capacities and needs occurs primarily through the influences of the forces of production. Further, since the productive forces are ultimately of men's own creation, man in effect creates himself, for he changes his own nature as he changes his external world. Man is both a product of society and its maker. He is a social being, for a human essence is not abstraction inherent in a single individual; rather it is an ensemble of social relations (Marx, 1967). Thus, the resultant individual is the totality of social relations, a social product.

From the viewpoint of historical materialism, Being determines consciousness, and human attitudes, opinions and evaluations are all historical products. The general psychological structure of man depends on the pattern of social relationships he experiences. These relationships are the basis of his consciousness -- they create it.

Man is not born with innate ideas or structures, but is instead born with certain possibilities of development that are organized according to historically formed psycho-physical structures. What he becomes in the course of ontogenesis is a wholly social product. It is formulated and imparted via language, which embodies a certain form of thinking.

Russian psychology has been based for the most part on the Marxist epistemological framework. Since Pavlov, the Russians have made a distinction between the first signal system, which is reflexive
orientation by the organism to its environment, and second signal system, which is language (Dale, 1966). Language serves to free the human organism from control by immediate stimulus events in the environment, thereby allowing mental planning and voluntary behavior.

Vygotski (1962), in his book, *Thought and Language*, advances a decidedly Marxist line in formulating a model of human cognitive development. In Vygotski's formulation, man is not only acted upon by stimulation from external reality, he also acts upon his environment in order to create new external stimuli. One such set of constructed stimuli that results in a modified response to the environment is man's linguistic communication system. This system is internalized by the child and becomes his highest self-regulatory system (Pavlov's second signal system). Consciousness is seen as developing and having its material embodiment in language. Man's development is further held to be discontinuous with other animals due to the existence of this system, which is a radical departure from a strict mechanistic S-R viewpoint.

Vygotski also argues that the primary mechanism by which consciousness is created is wholly external (a notion that finds considerable expression in the Marxist philosophical frame of reference). For example, he argues that only after language is used in social communication can it be employed with respect to one's own mental processes. Words evolve first as a means of external communication. Only then can they be employed in regard to one's own inner thoughts and feelings. (Note: This argument is strictly anti-Cartesian as it denies the

For Vygotski, the course of mental development is characterized by the internalization of initially external linguistic and conceptual forms and acts. There is also a recognition of thought itself, which is more inward than inner speech. Thought can only be accessed via inner speech, however, which in turn comes about as a result of our social communications.

Thus, as opposed to Piaget who holds that the development of thinking moves from individual to society, Russian psychology views thought as moving from the social to the individual, as "the speech structures mastered by the child become the basic structures of his thinking.... Thought development is determined by language, i.e., by the linguistic tools of thought and by the sociocultural experiences of the child.... The child's intellectual growth is contingent on his mastering the social means of thought that is language.... The nature of development itself changes from biological to sociocultural," (Vygotski, 1962, p. 51).

This viewpoint is carried forth in the work of Luria (1976), who concludes that "...the structure of cognitive activity...does not remain static during different stages of historical development, and that the most important forms of cognitive processes -- perception generalization, deductive reasoning, imagination, and analysis of one's own inner life -- vary as conditions of social life change,"
(p. 161). Thus, the "basic categories of human mental life can be understood as products of social history -- they are subject to change when the basic forms of social practice are altered and thus are social in nature," (Luria, 1976, p. 164).

In conclusion, Marxist dialectics hold that categories of thought as well as particular content are both derived from the external environment, i.e., the linguistic community into which one is born. Man is seen as an active creative organism, who both modifies his environment and in so doing modifies himself. The resultant organizational structures are thereby created via the interaction between the organism and the environment while at the same time they are first produced in and then in consequence derived from the environment external to the organism.

III THE MECHANISTIC PARADIGM

The mechanistic model sees development as occurring due to a history of environmental stimulation. Complete prediction is possible in principle, since efficient cause can give sufficient conditions. The organism is seen as reactive, and qualitative change is held to be either an epiphenomenon or is determined by quantifiable efficient causes. The whole is thus the sum of its parts, and efficient cause explains change, for it is the source of change. Development can be explained in terms of accretion of S-R connectors to which it is reducible. Behaviors, not structures, are primary and quantifiable.
Causality is unidirectional, and linear causality offers a complete and sufficient explanation. Inquiry is directed toward explication of S-R causal relationship, leading to prediction and control of behavior.

The mechanistic tradition's basic epistemological outlook can be found in the writings of Locke (1959), who advanced the notion that the mind at birth is a tabula rasa, a blank slate on which the hand of experience is free to write. All knowledge was held to arise from the external environment, which consists of sensible universals inhering in an underlying substance.

This empiricism was carried forward by Berkely (1901) in his Principals of Human Knowledge and Three Dialogues Concerning Natural Religion. He rejected Locke's notion of substance as being untrue to the empirical criteria that all knowledge must arise from experience. Since substance is not experienced, as we are only given sensible impressions such as color, shape, texture, etc., one cannot hold that something is existent beyond these various impressions we experience. Berkely finally lapses into idealism, however, as his dictum, "To be is to Be Perceived" is coupled with a God who always perceives, serving to guarantee that the existence of an object with no current human perceiver will continue, since it is a perception in the mind of God.

It is with David Hume (1951, 1955) that empiricism is set forth in the form that served as the foundation of the logical atomism of Russell (1921) and Wittgenstein (1951), the ultimate expression
of which can be found in Wittgenstein's *Tractatus*, and the logical positivism of the Vienna Circle, the most succinct statement of which is found in Ayer (1952).

Hume rejected the veracity of any concept, such as substance or God. He advanced the notion that any idea whose origin cannot be traced back to the level of sensory impressions should be rejected as meaningless.

When we entertain, therefore, any suspicion that a philosophical term is employed without any meaning or idea (as is but too frequent), we need but to inquire, from what impression is that supposed idea derived. And if it be impossible to assign any, this will serve to confirm our suspicion (1955, p. 21).

Hume's empiricism served as the foundation for a belief that cognitive development could be explained through an association of ideas derived from external experience in a strict cause and effect manner. Such knowledge was to be considered cumulative, and to be explained by the existence of sensible impressions, which could be broken down into component elements without loss of meaning and which were external to the organism.

This criterion of meaning and attendant empiricism, formulated by Hume, gave rise to logical atomism, positivism, and operationalism. The meaning of a term was seen to be the method of its measurement, and if no empirical measurement or translation into observable terms was possible, then a term was seen as meaningless. These criteria became in turn the central guidelines for the radical behaviorism that
has had such an impact on the American psychological scene. As Skinner (1945) noted, behaviorism has been nothing more than the complete operational analysis of traditional mental concepts. This operationalism has required that each mentalistic concept be tied definitionally to a single measuring operation, while the attendant positivist position has required that such concepts be fully definable in observable terms. Thus, if a mental concept cannot be so defined, it is meaningless (methodological behaviorism); if it can be so defined, it is empty (analytic behaviorism).

A succinct statement of an updated version of Locke's central epistemic position, i.e., tabula rasa, can be found in Gagne (1970), where he states that cognitive development can best be viewed as the result of the interaction of growth and learning since within the limitations imposed by growth, behavioral development results solely as a function of the cumulative effects of learning. Within this tradition, the cumulative effects of learning are seen as being explained by an analysis of past antecedent-consequent conditions. For such theorists as Bijou and Baer, the "...developing child may be adequately regarded in conceptual terms as a cluster of interrelated responses interacting with stimuli," (1961, p. 14).

Skinner (1974), probably the best-known proponent of this position in the current scene, argues that mentalistic concepts are worthless, as they do nothing in the way of controlling behavior. What is needed is a functional analysis of behavior, in order to identify and isolate those environmental variables of which the organism's behavior is a lawful function.
This learning theory viewpoint is succinctly defined by White as adhering to the following set of assumptions:

1. The environment may be unambiguously characterized in terms of stimuli.

2. Behavior may be unambiguously characterized in terms of responses.

3. A class of stimuli exists which, applied contingently and immediately following a response, increases it or decreases it in some measurable fashion. These stimuli will be treated as reinforcers.

4. Learning may be completely characterized in terms of various possible couplings among stimuli, responses and reinforcers.

5. Unless there is definite evidence to the contrary, classes of behavior may be assumed to be learned, manipulable by the environment, extinguishable and trainable (1970, p. 665).

CONCLUSION

In concluding our examination of various epistemic positions in psychology, it would seem that one can hold one of five broadly defined positions on how behavior develops within a given organism. (See Figure 1.1)

In position I, one can adhere to the notion that behavior and/or knowledge is innately inset. Three theoretical positions posited completely inset knowledge structures, where the influence of the environment or efficient causality was either 1) non-existent (Leibnitz); 2) existent but unimportant as it could only enhance or detract from development (Gesell); 3) existent and necessary for
EPISTEMIC INTERACTION PATTERNS
POSSIBLE BETWEEN ORGANISM AND ENVIRONMENT

\[
\begin{array}{cccccc}
  & 0 & 0 & 0 & 0 & 0 \\
\downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\
E & E & E & E & E \\
I & II & III & IV & V \\
\end{array}
\]

O = ORGANISM
E = ENVIRONMENT

FIGURE 1.1
actualization, but not for the formulation of actual content (Descartes, Ethologists). Each of these three positions viewed development as proceeding outward from the organism, where both the organization and content of knowledge, or the behavior displayed, were intrinsic to the organism.

Position II, like position I, is also contained within the organismic paradigm and can be found for example in the Kantianism of Piaget. It demarks a clearly different viewpoint on how such development progresses. Here the organizational elements necessary to a particular behavioral development are seen as either innately inset or as developing along epigenetic guidelines, while particular content displayed is seen as resulting from interaction with the external environment. Thus, efficient causality is seen as a necessary condition for the content of knowledge, although not for the structure of knowledge.

Position III (Hegelian) arises within the dialectical paradigm and holds that factors both within and extrinsic to the organism are necessary both to the organization and content of knowledge. Categories of thought are both intrinsic and extrinsic to the organism and behavioral organization arises due to a complex interaction of material, efficient, formal and final causality.

Position IV is also found in the dialectical paradigm, in the materialism of the Marxist position. Here there is an active organism, which, even though it generates changes in the structure and organization of the external environment, still derives both organization and content of its intellect from external sources.
Finally, in position V, both form and content of behavior are derived passively from external sources, with some account being taken of the material realities as causal in the organism. This position is found in more radical forms of behaviorism.

Finally, we have seen that position II, or the Kantian epistemetic position, is that to which Piaget seems to have made his philosophical commitment. It is to a more in-depth examination of this position that we must now turn, along with an examination of the implications this viewpoint has had for research into the area of mental retardation.
CHAPTER 2

PIAGETIAN THEORY AND ITS IMPLICATIONS FOR RESEARCH IN MENTAL RETARDATION

INTRODUCTION

The interpretation of Piagetian position has been open to more than a little controversy. Hunt (1961) has held that it is a completely non-maturational theory. Other interpreters of the same position have argued that the Piagetian position is too maturational in its outlook (Vernon, 1961). The truth would appear to lie between these two extremes, as Piaget rejects both a maturational unfolding of performed genetically-based formations, as well as an experiential line, where such factors are seen as being derived from the environment. Rather, the Piagetian framework is decidedly Kantian, as Piaget's objections to the maturational position would seem to be more in opposition to the preformation inherent in the Cartesian-like instinct doctrines of Lorentz, and the maturational unfolding of Gesell.

In Piaget's epistemology, knowledge is seen as arising neither "...from objects nor from the subject, but from interaction at first inextricable between the subjects and those objects," (Piaget, 1970, p. 704). Indeed, knowledge for the Kantian does not arise from either the environment or the subject, rather, as Piaget (1970) takes pains to point out:
The effects of maturation consist essentially of opening new possibilities for development, that is, giving access to structures which could not be evolved before these possibilities were offered. But between possibilities and actualization there must intervene a set of other factors such as exercise, experience and social interaction. The propositional logic, which is constructed between 12 and 15 years, is thus by no means the immediate consequence of the logic of neurons, but is the result of a sequence of successive constructions that are not preformed in the hereditary nervous system, but are made possible by this initial structure. So we are now very far from a model of continuous maturation which would explain everything by preformed mechanism, (p. 720).

The quotation cited above demonstrates that maturation within this theory has been tied to the biologically based unfolding of structures as organizational possibilities, which can be actualized only through interaction with the environment. These logicomathematical structures are of a biological origin, "...for they already exist in the genetic (DNA) programming of embryological organization of the mature organism before they appear, and are reconstructed at the different levels of behavior itself," (Piaget 1970, p. 706).

Piaget, like Kant, makes the same distinction between the organization and content of knowledge, while positing the structure of experience as inherent in the organism. The actual content of experience and resultant knowledge arises as a construction due to the internally organized activities of the organism in interaction with its environment.

Piagetian theory calls for four factors as necessary to cognitive development: biological maturation, experience with the physical environment, experience with the social environment, and the notion of equilibration. The latter of the above, equilibration or the notion of
equilibrium, emerges as a primary factor, for it is the final cause within the system. Equilibrium is seen as the progressive self-regulating process that leads step by step to the final state of logical-mathematical structures realized in the stage of formal operations. Equilibration occurs when less than optimally organized logical systems come to contain self-contradictions due to the child's interactions with its environment, and a force is set in motion in order to reorganize the child's ideas so that they are in harmony with one another. As a result of equilibration, the child, independent of further experience, tends to reorganize its beliefs into an increasingly coherent logistical whole. The child thereby comes to construct a harmonious, non-contradictory world, which adheres to an organizational structure, and whose relations are of a biological origin, but whose particular content can only come about via interaction with the social and physical environment.

The notions of assimilation and accommodation are also of primary importance to the aforementioned constructive process. Flavell (1963) notes that the essential process in the structuring of experience is that of bending a reality event to the template of one's ongoing structure. Assimilation constitutes this process whereby encountered objects in the environment are construed in accordance with the current organizational level of the organism's existent structural elements.

Accommodation, as opposed to assimilation, is the adoption of one's structural content to the reality demands which the world of objects impresses on it. According to Piaget, the interaction of the two are held to be inseparable:
...From the beginning assimilation and accomodation are indis-sociable from each other. Accomodation of mental structures to reality implies the existance of assimilatory schemata apart from which any structure would be impossible. Inversely, the formation of schemata throught assimilation entails the utilization of external realities to which the formal must accomodate, however crudely... (Piaget, 1954, pp 352-53).

This interplay between assimilation and accomodation would appear to allow cognitive structures to evolve via interaction between the organism and its environment. As we saw in the last chapter, however, beyond the more dialectically oriented description of the sensorimotor stage, Piaget posits an increasingly invariant quality to his logico-mathematical structures, (Riegel, 1977) and accomodations come increasingly to apply to the body of structured content. Meanwhile, the structure itself remains invariant and biologically derived.

This led Piaget to adhere to an invariant sequence of stages through which the individual passes, and it is to an examination of these levels of organization that we now turn.

Piaget and his collaborators hold that cognitive activity evolves through stages which follow a constant and invariant order. The progression consists of four main periods of development: sensorimotor, peroperational, concrete operational, and formal operational. The first of these, the sensorimotor stage, is in turn divided into six substages.

THE SENSORIMOTOR STAGE

The period of sensorimotor activities is marked by the child's construction of four fundamental forms of knowledge: objects, space, time and causality (Piaget, 1952). It is during this period that "the infant
moves from a neonatal reflex level of complete self-world undifferentiation to a relatively coherent organization of sensorimotor actions vis a vis his immediate environment," (Flavell, 1963, p. 86). The six substages are as follows:

Stage One (Reflexive)-- This period is marked by the complete lack of any genuine intelligence, and the child shows little beyond the reflexes he or she is born with.

Stage Two (Primary Circular)-- The child's reflexes begin to alter and some differentiation between assimilation and accommodation begins to occur. Primary circular reactions, defined as repetitions of sensorimotor responses centered around the infant's own body, also emerge.

Stage Three (Secondary Circular)-- The child's activities begin to be directed towards the exterior environment and secondary circular reactions (defined as attempts to reproduce environmental events over and over again, thereby displaying a precursor of intentionality) emerge.

Stage Four (Coordination of Secondary Schemes)-- The child begins to display the capacity to represent referents intentionally, and begins to experimentally imitate new events.

Stage Five (Tertiary Circular)-- The child begins to experiment actively for new means of achieving desired ends, and tertiary circular reactions (defined as repetitions of behavior schemes with variations in the resultant mode of operation) begin to emerge. The essence of tertiary circular reactions is the pursuit of the novel (Flavell, 1963).
Stage Six (Invention of new means through mental combinations)--
The child is now able to interiorize and internally represent, albeit in a primarily non-verbal manner, schemes of action allowing him to solve problems in an implicit trial and error manner.

Passing one of the periods of sensorimotor intelligence, the child enters the period of preoperational thought.

THE STAGE OF PRE-OPERATIONAL THOUGHT

At approximately one-and-one-half years to two years of age (Langer, 1967; Flavell, 1963; Balwin, 1967), the child passes into the period of preoperational thought. By the end of the sensorimotor period, the child has developed the ability to internally represent external events, but for the sensorimotor child there is no distinction between the schema or sign, and what it represents, i.e., the significant. Thus, it is during this period from approximately two to seven years that "the child is transformed from an organism whose most intelligent functions are sensorimotor overt acts to one whose upper-limit cognitions are inner symbolic manipulations of reality" (Flavell, 1963, p. 151).

The thought of the preoperational child is egocentric, as he is unable to take the perspective of another person into account (Piaget, 1926). If presented with a visual display at position A and then asked to describe how it would look from a position other than his own, a child will simply describe the representation from his own position (Piaget & Inhelder, 1956).
The preoperational child lacks critical thinking. He is unable to treat his own thought processes as an object of thought, and often appears illogical during this period. He is also unable to decenter his thought, and thus often pays attention to only one facet of the perceptual display, while failing to take into account other equally important factors. This leads to a fixation on the static states of a display, rather than on the various transformations through which it passes. Preoperational thought is thus quite static and concrete, as "things are what they appear to be in immediate egocentive perception" (Flavell, 1963, p. 159). An extremely important facet of preoperational thought, however, would appear to be its irreversibility. If a preoperational child is presented with a perceptual display such as two glasses of water that are judged as equal, and the two glasses of water are subsequently poured into two other glasses of unequal heights and widths, the preoperational child will then usually judge one amount as more. He is unable to see their equality because of his inability to either reverse the transformation, or to decenter in order to take into account features such as a decrease in width compensating for greater height of liquid in a glass. The preoperational child is a captive of the perceptual display (Bruner, 1964), for irreversibility of thought does not allow for the possibility of returning to the unchanged identity element present in the initial display (Piaget, 1928).

The thought of the preoperational child is also animistic and artificialistic, and the preoperational child has great difficulty in making a distinction between play and reality, for as Piaget notes, the
"...child's play constitutes an autonomous reality, but with the understanding that the 'true' reality to which it is opposed is considerably less true for the child than for us," (Piaget, 1924, p. 93).

The STAGE OF CONCRETE OPERATIONS

It has been noted that the period of preoperational thought is more marked by the failure to think operationally than by any clear definition of the thought processes peculiar to it (Baldwin, 1967). It is with the passage into the stage of concrete operations, occurring at approximately age seven to eight, that an increasing flexibility and coherence to thought begins to be realized. (The above ages are an approximation based on early Piagetian research. Other researchers have found conservational abilities, a hallmark of the concrete operational period, to occur by the age of five in a majority of children tested, e.g. Kooistra, 1965.)

Entering the period of concrete operations, the child acquires a notable flexibility of mental operations, as well as an increasingly coherent and integral cognitive system with which to structure the environment. This increasingly coherent and integrated system is a result of the continuing organization of operational structures into integrated systems, which Piaget (1950, 1957) feels can be described in terms of logico-mathematical structures.

Langer (1969) points out three major consequences of entry into this period:

1. The child's thought is no longer bound to the particular phenomenatal state of events, but begins to take into account
successive transformations ("detours and reversals").

2. The child's thought can and does change from egocentrism to perspectivism, and it becomes possible for him to perform multiplicative operations. He begins to coordinate different points of view (his own and others) into a system or logical group of objective reciprocities. He begins to realize that the nature of things is not absolute, but relative to the viewpoint from which it is considered. For example, when the child views liquid being poured from one container to another, he no longer sees only the change in height or in width, but in both. Simultaneous recognition that from one viewpoint the amount has increased, while from another viewpoint it has decreased, is necessary for the multiplicative coordination of these two variables.

3. The child begins to be capable of mentally performing transformational operations upon phenomental configurations. He can mentally isolate the relevant variables of a display and can apply his first approximations of reversible operations upon these variables. This is the mental source of the ability to form such concepts as conservation (Langer, 1969, pp. 141-142).

The child in the period of concrete operations is not, however, able to construct a logic that either stands independent from external events or is able to consider the possible as well as the actual. This ability emerges with the period of formal operations.

The STAGE OF FORMAL OPERATIONS

Formal thinking is defined as both thinking about thought (Prepositional logic is a second-order operational system which operates on prepositions whose truth, in turn, depends on class, relational and numerical operations) and a reversal of relations between what is real and what is possible (the empirically given comes to be inserted as a particular sector of the total set of possible combinations) (Inhelder & Piaget, 1958, pp. 341-342).

Whereas concrete operations are oriented toward concrete events in the immediate present, the period of formal operations marks a
shift of orientation from the real and concretely given to the possible. For "unlike the concrete operational child, the adolescent begins his consideration of the problem at hand by trying to envisage all the possible relations which could hold true in the data, and then attempts through a combination of experimentation and logical analysis, to find which of these possible relations in fact do hold true," (Flavell, 1963, p. 224). The resultant structure of thought is hypothetico-deductive in nature and is propositional in form, as it no longer considers just the raw data, but rather the assertions made about the data under consideration.

IMPLICATIONS OF PIAGETIAN THEORY

Let us now move to an examination of the implications Piagetian theory has for the field of mental retardation. Piaget sees cognitive development as dynamic. The mind progresses through qualitatively different levels of organization via an unfolding process, where earlier systems are subsumed and integrated into new higher order organizational systems. According to this viewpoint, mental retardation emerges due to the retarded child's inherent slowness in speed of development and failure to progress beyond the lower levels of cognitive organization.

Inhelder (1966, 1968) has been the major Piagetian theorist in this area. She holds that retarded reasoning is "...characterized by fixations or blocking of the operational activity at different stages of development," (Inhelder, 1966, p. 311). Accompanying her notion of fixation, which implies both slowness and a gradual
deceleration of development, with attendant fixation at a lower level terminal stage of development, Inhelder (1968) also advances the notion that retarded subjects exhibit a viscosity or stickiness of development. This viscosity both slows the progress of development and causes the utilization of less organized structures, which should have been discarded in favor of more advanced coordinations of operations. This occurs despite the fact that the child is capable of more advanced conceptual abilities. In support of this, a number of studies (Gerjuoy & Spitz, 1966; Milgram & Riedle, 1969; Gordon & Baumeister, 1971; Belmont & Butterfield, 1971, McMillian, 1972; Borkowski & Wanschurn, 1974) have shown that the retarded performer is not unable to use higher forms of organizational strategies for the processing of incoming data, but rather fails to habitually produce them.

Inhelder (1968) has gone so far as to propose a scheme of how adult performers could be classified according to stage of development finally achieved. She holds that severely and profoundly delayed individuals can be seen as fixated at the level of sensorimotor development; the moderately delayed adult is fixated at the preoperational intuitive period; and the mildly delayed individual is one who is unable to advance beyond the concrete operational level. Research by a number of others has tended to bear out the validity of classifying the retarded in this manner (Woodward, 1959; Woodward, 1962; Woodward & Stern, 1963; Lovell, 1966; Kershner, 1973).

This Piagetian viewpoint of how the retarded performer's progress is to be viewed has also been developed in depth in the writing of
Zigler (1966, 1969). His developmentalist position stands as a clear alternative to those who hold that cognitive development in retarded performers is fundamentally different in some respect from their normal counterparts (e.g., Luria, 1961, 1963; Spitz, 1963; Ellis, 1963; Kounin, 1941).

Zigler (1969), in line with the Piagetian position, advances the notion that although individuals with unlike IQ's will differ in rate of cognitive development and upper level of achievement, cognitive growth will proceed in a similar manner in both populations. "According to this model, the cognitive performance of individuals of differing IQ's who are at the same cognitive level and, therefore, at different chronological ages, should behave exactly the same on cognitive tasks," (Zigler, 1969, p. 540). Zigler goes on to advance the notion that the developmentalist position results in the hypothesis that there will be no difference in functioning between a population of familial retarded where organically impaired subjects are excluded, and normal subjects when they are matched on a general level of cognitive functioning. For pragmatic purposes Zigler holds that matching should be on the basis of mental age (M.A.), despite the problems inherent in this measurement.

Opposed to this viewpoint are those who adhere to what Zigler (1969) has labeled the difference position. As an example of this position, Milgram (1968) has argued that cognitive stages of retarded performers are organizationally different, as they are more likely to contain traces of more primitive levels, and thus regression is more likely.
Thus, M.A. matched retarded subjects are more likely to use less advanced reasoning. Zigler would argue that Milgram has failed to take motivational factors into account, and it would seem that Inhelder's notion of viscosity could also just as readily explain away Milgram's objections.

In a more recent article, Milgram (1969) argues against Zigler in a more subtle fashion. He advances the notion that matching for M.A. in no way guarantees that subjects so matched are "...comparable on problems, outside the universe of items tapped by the equating measures," (Milgram, 1969, p. 530). This position arises out of Milgram's (1968) contention that there is a difference between normals and retardants in mediational facility that will emerge in subjects matched for M.A. Mental age, it is argued, is a measure of content, not process, and as the utilization of differing processes can yield the same content, the assumption of equivalence in subjects matched for M.A. on a wide variety of cognitive tasks does not follow. Milgram argues that Zigler's position of relying on motivational and experiential factors to account for differences between groups so matched lacks validity, as demonstrable cognitive differences must also be taken into account.

And indeed, Milgram's argument would appear to have some veracity. Even Zigler (1969) admitted that he would have preferred to use a Piagetian measure of developmental level, but held that this was not feasible at the time of his article's appearance. Kohlberg and Mayer (1973) and McClelland (1973), as well as a variety of other authors,
have attacked the validity of IQ tests as measures of intelligence. Kohlberg and Mayer stated that "cognitive stage measures provide a rational standard for educational intervention where psychometric intelligence tests do not," (1973, p. 489).

A number of factor analytic studies have shown that Piagetian measures tap factors separate from those measured by psychometric tests (Kohlberg & Devries, 1975; Stephens, McLaughlin, Miller & Glass, 1972; Stephens, 1972). All the above authors found separate loadings for Piagetian tasks. Devries (1974) found that mental age as determined by the Stanford-Binet is a poor predictor of performance on most Piagetian tasks, particularly in the areas of conservation, identity, sorting, sibling, and transitivity tasks. She concluded that Piagetian and psychometric measures do mirror a real difference in cognitive measurement, for psychometric measures are concerned with "...how many correct answers can be given in a highly structured setting," and Piagetian tasks "...focus on the child's reasoning behind his conclusions," (Devries, 1974, p. 753). Devries agrees with Inhelder's (1968) comments, and in so doing echoes Milgram's (1969) objections to matching based on M.A. Although the Stanford-Binet, or any psychometric test, gives a numerical sum of successes and failures, "it remains a very tricky problem to go further and conclude from this summation of results anything about the way the child arrived at them, the intellectual constructions that enabled him to do so, or the nature of the deficiencies from which his failure stemmed," (Inhelder, 1968, p. 45).
EMPIRICAL FINDINGS

A great deal of research has been generated on this subject, much of it being favorable to the developmentalist thesis. In studies that have matched various groupings of retarded and normal subjects for M.A., similarity of abilities has been found in conservation of number (Achenbauch, 1973; Brown, 1973; Gruen & Vore 1972), conservation of weight (McManis, 1969a, 1969b), conservation of mass (Keasey & Charles, 1967; Devries, 1970, 1973a. 1973b, Goodnow & Bethon, 1966), conservation of length (Achenbauch, 1969; Devries, 1970), conservation of continuous quantity (Taylor & Achenbauch, 1975; Cardozo & Allen, 1975), anism (Granich, 1940; Prothro, 1943), moral judgment (Taylor & Achenbauch, 1975; Kahn, 1976; Simeonson & Foye, 1975), logical contradiction (Smith, 1977b), and perceptual decentering (Smith, 1977a), among a variety of other measures.

Yet these findings have not inequivocally supported the developmentalist thesis, as some researchers have found significant differences between populations so matched in such measures as conservation of weight (Goodnow & Bethon, 1966; Brekke & Williams, 1974), role-taking (Devries, 1970 and 1973), moral judgment (Kahn, 1976), conservation of mass (McManis, 1969b), relative thinking (McManis, 1970; Protho, 1943), and transitivity (Gruen, 1973; McManis, 1969a, 1970). Other authors have also found significant differences between retardants and normals when matched for M.A. on a variety of tasks (Stephens & McLaughlin, 1974).
In a recent review of the literature on this subject, Weisz and Yeates (1981) reviewed 30 studies involving 104 separate tests utilizing Piagetian measures. They found that of the 104 studies, only 24% supported the difference position, while over 70% supported the similar structure hypothesis inherent in the developmentalist position. Further, Weisz and Yeates went on to point out that over 90% of those studies excluding organically involved subjects appeared to support the developmentalist position. A similar review conducted by Weisz and Zigler (1979) also tended to bear out the two central developmentalist contentions, those being: 1) that subjects matched for M.A. will indeed show an equality of underlying cognitive organizational structures, providing that 2) organically involved subjects are excluded from the study.

Weisz and Yeats concluded that "when mentally retarded subjects suffering from organic impairment are excluded, retarded and non-retarded persons of the same developmental level (i.e., M.A.) do seem to use the same cognitive processes, at least in the cognitive domains addressed by Piaget," (1981, p. 175). As they point out, however, the returns from other domains are not yet in.
CHAPTER 3
THE DEVELOPMENT OF SOCIAL COGNITION IN NONRETARDED AND RETARDED POPULATIONS
INTRODUCTION

In chapters one and two we examined the epistemic commitments of the Piagetian position and the resultant implications for research and theorizing in the study of mental retardation. Specifically, as pertains to M.R., we examined the developmentalist position advanced by Zigler (1969), where it was posited that subjects matched for mental age will show a similarity of cognitive processes when dealing with a wide array of cognitive tasks.

In this chapter, let us turn our attention to the dispute between developmentalist and difference theorists as to the course of cognitive development in retarded versus normal subjects, an area in which little research has been done. This is the domain of social cognition and/or intelligence, which Greenspan (1979) defines as "...a person's ability to understand and deal effectively with social and interpersonal objects and events," (p. 483). The concept as stated above is not a new one, appearing originally in Thorndike's (1920) tripartite model of intelligence. Most recently, it has appeared in Guilford's (1967) three-dimensional structure of intellect model, as the plane of behavioral abilities.
In a recent article which appeared in *The Handbook of Mental Deficiency*, Greenspan (1979) provided the reader with a succinct and multifaceted taxonomy of what he feels are the distinguishable component elements of social intelligence. He defined the construct of social intelligence as being constituted by the following three major subdivisions: social sensitivity, social insight, and social communication. Contained within the first of these subdivisions are two variables: role taking, defined as the ability to infer what the other is seeing, hearing, or feeling; and social inference, defined as the ability to infer from cues provided in the situation what is occurring in a given situation.

The second major subdivision, denoted as social insight, is defined as the ability to reflect upon the meaning of interpersonal institutions and processes. It consists of the following three separably defined variables: social comprehension, which is defined as the ability to think about social situations; psychological insight, which deals with the ability to recognize and reason about motivational aspects and personal characteristics of people; and moral judgment, which is defined as the ability to reason about the ethics of interpersonal behavior.

Finally, the third major subdivision, social communication, is defined as the ability to intentionally manipulate others into meeting one's needs. It can be divided into two variables: referential communication, which is defined as the ability to provide others with
sufficient cues so that they know what one is doing, thinking etc.; and social problem solving, which is the ability to effectively deal with others in situations involving conflicting needs.

Although there has been a considerable growth of interest in the examination of the development of social intelligence, there has been little empirical examination of whether retarded performers do follow the same developmental sequence as normal MA matched peers in their development of skills within this domain. Some research has been conducted, using MA matched groups, in the areas of role taking (Rubin & Orr, 1974; Devries, 1970, 1973; Simeonsson & Foye, 1975; Taylor & Achenbach, 1975) and moral judgment (Taylor & Achenbach, 1975; Simeonsson & Foye, 1975; Kahn, 1976). Results obtained in these experiments have been mixed in their support of the developmentalist position.

Concerning moral judgment, Taylor and Achenbach (1975), in an experiment where they selected 30 nonretarded and 30 mildly retarded children matched for MA's of 6½, 8, and 9½, found that nonretarded and retarded groups did not differ significantly in their ability to make moral judgments. These findings were borne out by Simeonsson and Foy (1975), who found no differences in moral judgments between nonretarded children (CA 7-8) and MA matched mildly retarded adolescents and adults. Kahn (1976) also found support for the developmental thesis. He matched nonretarded, mildly retarded, and moderately retarded groups for MA. Consistent with Zigler's (1969) position, he found that the first two groups showed no significant difference in level of moral development attained; the moderate group, however,
which was more organically involved, was significantly inferior to the nonretarded group. He concluded that "similarity of performance by (MA matched) retarded and nonretarded children does not extend to retarded children with etiologies other than cultural-familial retardation," (1976, p. 213).

In the area of role-taking, the support for the developmentalist thesis has been less consistent. Rubin and Orr (1974), in a study of spatial perspective-taking which required subjects to either identify or construct the perspective of another person of a stimulus array, found that MA matched nonretarded and mildly retarded subjects did not differ significantly. Taylor and Achenbach (1975) also found, using two role-taking tasks, that retarded and normal subjects matched for MA display a similar level of role-taking skills.

The above findings have not, however, been borne out in two other studies. Devries (1970, 1973), in a large scale study which did not control for organicity, found that retarded children were significantly inferior to MA matched normal peers in being able to take another's perspective in a game situation. These findings were also borne out somewhat by Simeonsson and Foye (1975), who, using their Sequenced-Picture-Task, found adolescent and adult EMR subjects to be significantly more egocentric than MR matched first graders.

THE PROBLEM

We can see that aside from the areas of moral judgment and role-taking, little work has been done in the broader area of social
cognition, concerning whether retarded performers do follow the same developmental sequence as those of normal intelligence. Given this fact, my dissertation will attempt to examine whether retarded performers and normal subjects, when matched for a level of cognitive functioning (i.e., either MA or operational level), will utilize similar cognitive inferential abilities when making inferences regarding a pictured social situation. A correct description of what is going on in the pictured social situation will require the ability to do the following: 1) infer what is going on in the situation in which the actor is involved (social inference), 2) infer what the actor is feeling (affective role-taking), and 3) infer why the actor is behaving the way he or she is in the situation, requiring an assessment of the motivational aspects of the situation (psychological insight).

IMPORTANCE OF STUDY FOR ADVANCING UNDERSTANDING

The significance of my study is complex and multifaceted, involving the following areas of investigation:

1. My study will allow me to partially replicate the Edmonson, De Jung, Leland, and Leach (1971) work on differences in social inference abilities in retarded and nonretarded groups matched for chronological age. Further, my study will examine whether there will be a significant difference in performance of retarded and nonretarded groups when matched for mental age or operational level. Questions: (A) Will either the retarded or nonretarded groups display a significant difference between groups in measured social inference abilities, i.e., TSI scores, at different chronological ages? (B) Will groups
of retarded and nonretarded subjects matched for chronological age show a significant difference in social inference abilities as measured by the TSI? (C) Will groups of retarded and nonretarded subjects show a non-significance of differences in measured social inference abilities, as measured by the TSI, when matched for mental age or operational level?

2. My study will allow me to replicate, in part, Charette's (1972) study, which found a significant shift in type of response on the TSI; specifically, with increasing age, responses shift from enumerative, to descriptive, to inferential. Further, my study will examine whether the same developmental progression holds true for retarded subjects, as well as whether mentally retarded and nonretarded subjects will show significantly different configurations of response types when matched for chronological age, mental age, or operational level. Questions: (A) Will there be a significant difference between groups of retarded or nonretarded at different chronological ages in frequency of response types on a test of social perception, i.e., the TSI, where response types are defined as enumerative, descriptive, or inferential? (B) Will retarded and nonretarded groups matched for chronological age display similar configurations of response types between groups? (C) Will retarded and nonretarded subjects matched for mental age or operational level display similar configurations of response types between groups?

3. Harris (1977) and Iacobbo (1977) both found that, when matched for chronological age, retarded performers had significantly
less ability to recognize the emotional meaning of facial expressions. Questions: (A) Will groups of retarded and nonretarded subjects matched for chronological age show a significant difference in ability to make emotional ascriptions based on pictured facial expressions? (B) Will retarded and nonretarded groups matched for mental age or operational level show a significant difference in ability to make emotional ascriptions based on pictured facial expression?

4. This study will allow a statement to be made about differences between experimental groups in the ability to make inferential statements of the following forms: (1) "Actor X feels emotion Y because of an event Z"; (2) "Actor X did action Y because of Z"; (3) "Actor X did action Y because of Z", where a specific event is substituted for Z; (4) "Actor X did action Y because of Z," where Z is a specified emotion or intention. Questions: (A) Will there be a significant difference between retarded or nonretarded groups of different chronological ages in generating inferences in the forms listed above? (B) Will there be a significant difference between retarded and nonretarded groups when matched for chronological age in their respective abilities to generate inferences in the above forms? (C) Will there be a significant difference between retarded and nonretarded groups when matched for mental age or operational level in their respective abilities to generate inferences in the forms listed above?

5. My study will also examine Selman's (1973, 1980) contention that the ability to take another's perspective in order to make statements where intentions are seen as causal in explaining why the other
person acted as he or she did, emerges in conjunction with the ability to conserve. My study will also allow me to make a statement about whether a similar emergence of abilities occurs in the retarded population, via the analysis conducted of intentional ascriptions cited in number four. Question: Will there be a significant difference between groups composed of pre-operational versus concrete operational subjects, when matched for chronological age, in ability to make causal statements of the form, "Actor X did action Y because of intention or emotion Z?"

6. Finally, my study will examine whether there is a significant difference between groups matched for a differential level of intelligence, i.e., mental age, versus those groups matched for a developmental measure, i.e., operational level, in social cognitive abilities displayed, when chronological age is held constant for groups so matched.

STATEMENT OF HYPOTHESES

The hypotheses listed below, stated in null form, are a direct outgrowth of the questions posed in each interest area cited in the previous section.

1) There is no significant difference in measured social perception, i.e., total Test of Social Inference scores, among retarded or nonretarded children at different chronological age levels.

2) There is no significant difference between retarded and nonretarded groups in measured social perception, i.e., total Test of Social Inference scores, when matched for chronological age.
3) There is no significant difference in measured social perception, i.e., total Test of Social Inference scores, between retarded and nonretarded subjects when matched for mental age and/or conservational level.

4) There is no significant difference in frequency of type of response to a test of social perception, i.e., Test of Social Inference, between groups of children of different chronological ages, where response types are defined as enumerative, descriptive, or inferential.

5) There is no significant difference in frequency or type of response on a test of social perception, i.e., Test of Social Inference, between children of retarded and nonretarded populations when matched for chronological age, where response types are defined as enumerative, descriptive, or inferential.

6) There is no significant difference in frequency of type of response to a test of social perception, i.e., the Test of Social Inference, between children of retarded and nonretarded populations, when matched for either mental age or operational level, where response types are defined as enumerative, descriptive, or inferential.

7) There is no significant difference between retarded and nonretarded children in the ability to make intentional ascriptions based on facial expression, when groups are matched for chronological age.

8) There is no significant difference between retarded and nonretarded groups in the ability to make intentional ascriptions based on facial expression, when matched for mental age or operational level.
9) There is no significant difference between retarded or non-retarded groups of different chronological ages in their ability to generate causal inferences of the form, "Actor X feels emotion Y because of event Z."

10) There is no significant difference between retarded and non-retarded groups, when matched for chronological age, in the ability to generate causal inferences of the form, "Actor X feels emotion Y because of event Z."

11) There is no significant difference between retarded and non-retarded groups, when matched for mental age or operational level, in their ability to generate causal inferences of the form, "Actor X feels emotion Y because of event Z."

12) There is no significant difference between retarded or non-retarded groups of different chronological ages in their ability to generate causal inferences of the general form, "Actor X did action Y because of Z."

13) There is no significant difference between retarded and non-retarded groups, when matched for chronological age, in the ability to generate causal inferences of the general form, "Actor X did action Y because of Z."

14) There is no significant difference between retarded and non-retarded groups, when matched for mental age or operational level, in the ability to generate causal inferences of the general form, "Actor X did action Y because of Z."
15) There is no significant difference between retarded or non-retarded groups of different chronological ages in their ability to generate causal inferences of the form, "Actor X did action Y because of event Z."

16) There is no significant difference between retarded and non-retarded groups in their ability to generate causal inferences of the form, "Actor X did action Y because of event Z," when matched for chronological age.

17) There is no significant difference between retarded and non-retarded groups in the ability to generate causal inferences of the form, "Actor X did action Y because of event Z," when matched for mental age or operational level.

18) There is no significant difference between retarded or non-retarded groups of different chronological ages in their ability to generate causal inferences of the form, "Actor X did action Y because of emotion or intention Z."

19) There is no significant difference between groups of retarded and nonretarded subjects when matched for chronological age, in ability to generate causal statements of the form, "Actor X did action Y because of intention or emotion Z."

20) There is no significant difference between groups of retarded and nonretarded subjects, when matched for mental age or operational level, in the ability to make causal statements of the form, "Actor X did action Y because of intention or emotion Z."
21) There is no significant difference between groups composed of pre-operational versus concrete operational subjects, when other factors such as mental and chronological age between groups are held constant, in the ability to generate causal statements of the form, "Actor X did action Y because of intention or emotion Z."

22) There is no difference between subjects grouped on the basis of mental age versus those grouped for operational level on each of the measures cited in this experiment.

SUPPORTING LITERATURE

Research has been done in each of the areas in which I am interested, but it has not involved groups of performers matched for MA. In the area of Social Inference, little developmental research has been undertaken. The main researchers in this area have been Barbara Edmonson and her colleagues (Greenspan, 1974). Using the Test of Social Inference (Edmonson, Jung, Leland & Leech, 1966), these researchers found that retarded adolescent subjects scored approximately one standard deviation below their CA matched normal peers (Edmonson, et al., 1971, 1974). Greenspan (1979), in summarizing this work, concluded that these findings bear out the fact that "the construct of social inference tapped by the Test of Social Inference appears to be a variable that follows a regular developmental progression in normal children... and is a dimension in which most children with serious intellectual deficits are deficient," (p. 493).
In accordance with the above, a number of researchers have noted this inability of retarded subjects to derive intended meanings from pictures presented to them (Beck, 1952; Beier, Gorlow & Stacey, 1952; Denhof and Robinault, 1960; Butler, 1961; Gorlow, Butler & Guthrie, 1963; Luria, 1963). Edmonson, et al. (1971) has set forth the notion that the retarded have both 1) failed to discriminate socially relevant material from socially irrelevant details, and 2) failed to classify or categorize incoming information as well as normal individuals, as has been found by other investigators (Bousfield, 1953; Rossi, 1964; Stephens, 1964, 1966; Spitz, 1966, 1973). Indeed, as Clark and Thompson (1963) have found, this inability to categorize among the retarded is especially prevalent in social settings.

In a recent dissertation, Charette (1972) attempted to chart the developmental progression inherent in social inference abilities. Using a sample of fifteen boys and fifteen girls at three age levels (7, 10, and 13 years of age), she administered the Test of Social Inference. Findings indicated three types of responses: 1) enumeration of objects depicted, 2) descriptions of objects depicted, and 3) inferences based on the situation depicted. In line with the research by Estvan and Estvan (1959), it was found that enumerative responses were rare by age seven, with the preponderance of responses being of a descriptive nature. Inference type responses increased in frequency until by age 13 almost all responses were of this type. Inference responses were in turn classified as either appropriately based on stimuli cues
presented; or as inappropriate, representing a misinterpretation of
cues present. Again, ability to make correct inferences increased as a
function of age.

On the basis of the above research in social inference, two facts
emerge. First, a developmental progression is inherent in the ability
to make inferences based on depicted social stimuli. This progression
moves from simple enumeration, into description, and finally to inter-
pretation of stimuli presented. Second, retarded subjects are sig-
nificantly less accurate than CA matched peers in making inferences
based on social stimuli. This, of course, is in essence a more in-depth
restatement of Greenspan's (1979) observations of the conclusions one
can draw from research in this area.

In the area of affective role taking, Iacobbo (1977) examined recog-
nition of affect displayed in facial expressions by mildly retarded and
nonretarded children and adults matched for chronological age. He
found that the retarded group performed significantly more poorly than
their CA matched normal IQ peers. These findings were borne out by
Harris (1977) in his study involving groups of CA matched subjects.

Finally, turning to the area of psychological insight, one finds
that the main developmentalist work in the area has been done by Selman,
who has developed an in-depth structural model of how social comprehen-
sion, role taking, and psychological insight develop.

As has been pointed out by Selman (1976), the cognitive develop-
mental point of view looks for structural levels in the child's under-
standing of the following three domains:
1. The physical domain: Conceptions of physical objects and of the relation of the self to these objects....

2. The logical domain: Conceptions of classes and subclasses, relations, and the ordering of relations between classes.

3. The social domain: Conceptions of the self, the relation of the self to others (role taking), and the means for resolving conflicts of different selves (moral reasoning) (p. 311).

This tradition is concerned with how children reason about social phenomena as it reveals underlying cognitive structures, and not with what they reason, as explicit content. The basic assumption underlying Selman's work is that the child progresses through an invariant sequence of qualitatively distinct stages. These stages display a hierarchical property in which higher levels build upon and emerge from lower levels of functioning.

Selman (1973, 1975, 1976, 1980) proposes a parallel developmental relationship between logical, social role taking, and moral judgment stages. His research, as we shall see, has tended to bear out Flavell's (1970) assertions that the child's interpretations of others begins with a superficial description of surface manifestations, and only gradually moves into an understanding of the inner-dynamics of the covert processes of thoughts, feelings, etc. Along with Flavell, Selman's model suggests that as the child ages, he becomes more and more aware of complex internal psychological events due to a lessening of his or her own egocentricity.
Selman proposes the following 5-stage developmental sequence:

Stage 0 - Egocentric Role Taking (age 3-6): The preoperational child at this stage fails to differentiate the point of view of the other from his own. "Selves and others are clearly differentiated as physical entities, not psychological entities," (Selman, 1980, p. 37). There is an inability to make causal ascriptions where thoughts or motives are seen as underlying behaviors. As a consequence, there is no clear distinction between intentional and non-intentional behavior, for although the child can label the other's overt feelings, he cannot see the cause-effect relation of reasons to social actions.

Stage 1 - Social-Informational Role Taking (circa age 6-8): Here, in concordance with an emergence into the stage of concrete operations, there is "...a clear differentiation between physical and psychological characteristics of persons," (Selman, 1980, p. 38). Each person is seen as having a unique perspective, although only one perspective is considered right or true (Selman, 1976). There is an understanding of the distinction between intentional and unintentional actions, with an accompanying emergence of the ability to ascribe personal reasons or motivations as cause for an actor's actions. Thoughts are thus seen in a causal relationship to actions.

Stage 2 - Self Reflective Role Taking (circa age 7-12): Here the child is able to "...step mentally outside him- or herself and take a self-reflective or second person perspective on his or her own thoughts and actions, and on the realization that others can do so as well," (Selman, 1980, p. 38). There is also an emergent realization that others
are multimotivated and may have conflicting tendencies in a situation. Thus, a person may have multiple conflicting feeling states such as being both happy and sad.

Stage 3 - Mutual Role Taking (circa age 10-15): At this stage "...persons are seen by the young adolescent ...as systems of attitudes and values fairly consistent over the long haul, as opposed to randomly changeable assortments of states as in level 2," (Selman, 1980, p. 39). People are now seen as having the possibility of having mixed thoughts and feelings toward the same object at the same time. There is also a realization that the self and other can consider each party's point of view simultaneously and mutually, as each can put himself in the other's place (Selman, 1976).

Stage 4 - Social and Conventional System Role Taking: At this stage the adolescent comes to understand that "...there are more complicated interactions within a person that cannot be understood by the observing ego of level 3," (Selman, 1980, p. 39). There is a generation of a concept akin to the unconscious, since "thoughts, motives, or feelings are understood to be psychologically determined but not necessarily self-reflectively understood," (p. 40). The self is held to be a system of beliefs, values, attitudes, etc., with a developmental history. Perspective taking is elevated from a dyad to the level of a general social system, where there is "...construction of conventional perspectives which all members share in mutual relationship to his own," (Selman, 1976, p. 306).
Selman and Byrne have conducted several empirical studies based on the above model. The first (Selman & Byrne, 1974) involved 40 children at ages 4, 6, 8, and 10. Findings showed strong age-related emergence of levels of perspective taking abilities. They found that the development of perspective taking did seem to adhere closely to the structural conceptual progression cited earlier.

The second study (Byrne, 1973) involved 56 males, 14 each at ages 10, 13, 16, and adult. Level of perspective taking displayed by subjects was again significantly correlated with age ($r=.86$).

Finally, in a third study involving longitudinal data collected over a 15 year period from 10 subjects (Selman, 1980), definite support was found for the hypothesis that the child's ability to develop perspectives of the self and others can be described according to an invariant sequence of stages.

A variety of other researchers have also found empirical support for some aspects of this developmental model. Lively and Bromley (1973) and Peevers and Secord (1973) have both noted that pre-operational children attend to the highly observant surface cues of people and situations, whereas the operational child, circa age 6-7, is able to describe and understand dispositions, intentions, beliefs, and traits, based on regularities in people's behaviors. Feffers (1970) and Flavell (1968) have also found that the ability to understand that another person might have a perspective different from one's own occurs at approximately age 6 to 7, coinciding with the emergence of the ability to decenter and conserve, which surfaces with the passage of the child into the stage of concrete operations.
In a recent review of the literature pertaining to this subject, Shantz (1975) concluded that developmental findings seem to support the conclusion that:

By six years of age the child can usually infer that another may have different thoughts or knowledge than the child himself, and by middle childhood he is aware that others can think about the child's thoughts (p. 289).
CHAPTER IV

RESEARCH DESIGN

Ninety-six subjects, consisting of retarded and nonretarded children and adolescents, were divided into eight groups of twelve subjects each, based on factors such as chronological age, mental age, and ability to conserve. Resultant group configurations are depicted in Table 1. Subjects were assigned to their respective groups based on scores obtained on the Peabody Picture Vocabulary Test - Revised, Form L, which rendered the subject's mental age; and based on scores obtained through a variety of tasks drawn from the Concept Assessment Kit - Conservation, which measured the subject's ability to conserve.

A short form of the Test of Social Inference (TSI) was administered to each subject after assignment to appropriate groups had been accomplished. The groups were then examined to see whether they differed significantly in respect to the following: 1) overall score obtained on the short form of the Test of Social Inference, 2) types of response made (i.e., either enumerative, descriptive, or inferential; the last of which was scored as either justified or unjustified by the pictorially presented material), 3) ability to make emotional ascriptions, 4) ability to make a causal connection between environmental events and emotional response displayed by
### TABLE 1

**Typification of Experimental Groups by Chronological Age, Mental Age, and IQ Range**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>CHRONOLOGICAL AGE (APPROXIMATE)</th>
<th>LEVEL OF FUNCTIONING</th>
<th>IQ RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>5</td>
<td>MA=5</td>
<td>AVERAGE</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>8-9</td>
<td>MA=5</td>
<td>MILDLY DELAYED</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>5</td>
<td>NON-CONSERVER</td>
<td>AVERAGE</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>8-9</td>
<td>NON-CONSERVER</td>
<td>MILDLY DELAYED</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>8-9</td>
<td>MA=8-9</td>
<td>AVERAGE</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>12-14</td>
<td>MA=8-9</td>
<td>MILDLY DELAYED</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
<td>8-9</td>
<td>CONSERVER</td>
<td>AVERAGE</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>12-14</td>
<td>CONSERVER</td>
<td>MILDLY DELAYED</td>
</tr>
</tbody>
</table>
the pictured actor, and 5) ability to see intentions and/or environmental events as playing a causal role in activities the various actors engaged in.

THE SAMPLE

The population used in this experiment consisted of 96 students selected from three school districts within a 75 mile radius of Parsons, Kansas. Half of the 96 subjects were children whose IQ range placed them within the average range of functioning. Of these 48 subjects, half were five year old children, who exhibited a mental age of approximately five years of age. The other half were children of eight to nine years who displayed a mental age of approximately eight to nine years. The above two groups of 24 children were in turn each divided into two groups of twelve. One of the resultant two groups of twelve that consisted of five year old subjects was then tested, and all members were required to show no signs of conservation ability, as measured by the tasks drawn from the Concept Assessment Kit - Conservation. The other groups of five year old subjects were not so tested; the only requirement for membership was that they demonstrated a mental age of approximately five years. Of the remaining two groups of twelve subjects, which consisted of eight to nine year old children of average intelligence, one was required to consist solely of subjects who did demonstrate an ability to conserve, as opposed to the remaining group, where the only requirement for membership was that all members demonstrate a mental
age of approximately eight to nine years. These 48 subjects were all
drawn from the Washington Elementary School in Parsons, Kansas.

The other 48 subjects were drawn from EMR classrooms in eleven
elementary and six junior high schools. Three special educational
cooperatives were utilized, and eight different communities were
visited in order to obtain the needed subjects. All 48 of these sub-
jects were children whose IQ range placed them within the mild range
of mental retardation. Half of these subjects were eight to nine
years of age and displayed a mental age of approximately five years.
The other half were twelve to fourteen years of age and displayed
a mental age of between eight to nine years.

The 24 mentally retarded subjects, whose ages ranged from eight
to nine years of age, were in turn divided into two groups of twelve,
one of which consisted of only those children who displayed no con-
servation abilities. The remaining 24 mentally retarded subjects,
whose ages ranged from twelve to fourteen years, were also divided
into two groups of twelve, one of which was required to consist of
only those children who did display the ability to conserve.

SELECTION PROCEDURE

Criteria for initial consideration for inclusion in this study
were 1) a chronological age that fell within necessary limits, i.e.,
either five or eight to nine years of age in the case of those sub-
jects of average intelligence, versus eight to nine or twelve to
fourteen years of age in the case of those subjects classified as
mildly delayed; 2) inclusion in a regular classroom, in the case of those subjects of average intelligence, or inclusion in an EMH classroom, to insure that those subjects classified as mentally retarded had intelligence quotients within the 55 to 70 IQ range; and 3) no readily discernable indices of organic impairment.

A letter (appendix A) was mailed to the parents of those children initially deemed acceptable for inclusion in the study, chosen from those agencies first approached. This was later revised, as response to mailed permission slips was less than satisfactory; a far better response was elicited by sending the letter home with the child from the classroom and requesting that it be returned to the teacher, rather than be mailed to the experimenter. A follow-up letter (appendix A) was also sent to those students whose parents did not initially respond.

The initial groups to be tested were those 48 subjects falling within the range of average IQ functioning. Each subject was first tested with the Peabody Picture Vocabulary Test - Revised (PPVT-R) to ensure that their MA did indeed fall within the required range. Half of the 24 subjects in the five year old range were also tested for conservation abilities, to ensure that none of these subjects displayed conservation abilities. This procedure of testing only half of an age group for conservation abilities was subsequently modified with the 24 eight to nine year old subjects, when it was discovered that several eight to nine year old subjects, whom one would expect to display conservation abilities, did not do so. Indeed, seven out of the twelve individuals included in the group
matched for a mental and chronological age of eight to nine did not display an acceptable level of conservation abilities (i.e., scored eight out of possible ten on presented conservation tasks).

All mentally retarded subjects were also initially tested with the PPVT to ensure that their mental ages were within an acceptable range. Fifty percent of the eight to nine year olds who exhibited a mental age of five were also screened with those conservation tasks discussed earlier, to ensure that they were non-conservers. All of the twelve to fourteen year old subjects who displayed a mental age of eight to nine were also tested for conservation abilities, as approximately sixty percent of those tested did not display an acceptable level of these abilities. As a result, the entire group of mildly retarded twelve to fourteen year olds that were matched for a mental age of eight to nine, consisted of non-conservers.

INSTRUMENTATION

In this experiment, three instruments were used to establish mental age, conservation abilities, and indices of social intelligence.

Test of Mental Age

To establish examinee's mental age it was decided to use the Peabody Picture Vocabulary Test - Revised (PPVT-R) Form L. First developed by Dunn (1959), it was revised in 1981 (Dunn and Dunn, 1981). It is a nonverbal, multiple choice test that allows the examiner to measure an MA range from 2½ years to adult. The only
requirements of the subject are that they be able to hear the examiner and be able to indicate choice of response by pointing, verbalization, or other manner.

The PPVT-R was standardized on a population of 4,200 children, ages 2½ through 18, and 828 adults, ages 19 through 40 years of age. Form L has a split-half reliability that ranges from .67 at the 2½ year level, to .88 at the 18 year level.

As the PPVT-R is relatively new, validity studies have not yet been conducted. Validity studies of the PPVT, to which the PPVT-R is very similar, have shown median correlations of approximately .60, ranging from approximately .20 to .90, with other tests of intelligence (Sattler, 1982). One problem that has been noted is that the PPVT at least has had the tendency to yield lower IQ's than, for example, the Stanford-Binet, with differences as large as 30 to 40 points being reported, (Sattler, 1982).

Test of Conservation

In order to establish the presence or absence of conservation abilities, it was decided to use five of the six conservation tasks utilized in the Concept Assessment Kit - Conservation (Form A) developed by Goldschmid and Bentler (1968). This assessment kit arose as a result of a series of two experiments (Goldschmid, 1967; Goldschmid & Bentler, 1968) where ten experiments modeled after Piaget and his followers (e.g., Flavell, 1983) were developed to measure conservation
of substance, weight, continuous and discontinuous quantity, number, area, distance, length, and two- and three-dimensional space.

Six of these tasks were grouped into Form A of the Concept Assessment Kit - Conservation (Goldschmid & Bentler, 1968a). These six tasks are conservation of substance, number, continuous quantity, two-dimensional quantity, and weight, which are here listed in order of difficulty for the subjects tested. This test has been utilized by Rubin (1973) in assessing conservation abilities in order to examine these relationships with the developmental progression of egocentricism in childhood. In his experiment he used five of the six tasks in Form A of the assessment kit, excluding only discontinuous quantity. He scored each task using a two point scale, giving one point for a correct answer that recognized equality after transformation, and one point for an explanation of why two apparently dissimilar quantities were judged as the same, if the explanation noted either reversibility of the operation, compensation of one dimension of change with another, or invariant quantity.

Rubin's (1973) format was adapted for use by this experimenter, revising it only by substituting a measure of discontinuous quantity for a measurement of conservation of weight. This revision was made due to the lack of a scale necessary to assess the subjects' weight conservation abilities. A subject was judged to be a conserver if he/she attained a score of eight out of the possible ten points.

The four steps presented in Goldschmidt's (1967) original experiment were followed in presenting each task. First the subject
was familiarized with the materials; second, it was ascertained that the subject perceived the initial equality of the objects he or she was asked to compare; third, after the manipulation of one of the two objects the child was once again asked to judge their equality or inequality; and fourth, the subject was asked to explain why the two objects were equal or unequal with respect to the measured unit that was being conserved.

Brief descriptions of each experiment will now be made, since the actual Concept Assessment Kit was not used. The format used, however, closely follows both that cited by Goldschmid (1967) and that used in formulating Form A of the Concept Assessment Kit in Goldschmid and Bentler (1968b).

Substance - After the subject had examined, manipulated amounts of, and subsequently agreed that two clay balls (three inch circumference) were the same amount, one of the balls was then transformed into a pancake of approximately one inch of thickness. The subject was then asked to compare the transformed ball with the original, regarding the relative amount of clay in both balls.

Continuous quantity - Two identical beakers (100 milliliters) were first filled with equal amounts of water (100 milliliters). Subject was asked to compare quantities, and, when judged as equal, one beaker was poured into a tall thin beaker (100 milliliters). Subject was then asked to compare the amounts of water as to equality.

Discrimination quantity - The same procedure as in continuous quantity was followed with larger beakers (500 milliliters), employing corn grains instead of water.
Number - The "unprovoked correspondence experiment" used by Goldschmid (1967) was adhered to. Six blue blocks were aligned with six green blocks, the approximate distance between blocks equaling four inches. When the two groups were confirmed by subject as containing the same number, they were then transformed. The blue blocks were grouped at two inches apart while the green blocks were grouped at six inches apart. The child was then asked to compare number of blue versus green blocks.

Two-Dimensional Space - In this task, 32 flat red dominos were used, solid tone side facing up. These were grouped into two sixteen-piece squares, and the child was asked to confirm that they were the same in amount. One square was then transformed into an elongated rectangle of two rows of eight. Subject was then asked to compare amount of blocks in the rectangle versus the square arrangement.

These tasks were presented in the above listed order, until either the subject had demonstrated an unacceptable level of conservation ability (i.e., failed two of the above), or had successfully completed all five of the tasks presented.

Test of Social Intelligence

Finally, in order to measure the ability of examinees to interpret social cues, as well as to make intentional ascriptions and to see intentions thus ascribed as causal in actions engaged in by individuals pictorially depicted, it was decided to use the Test of Social Inference. This test was formulated by Edmonson, De Jung, Leland, and Leach (1966), in order to measure abilities in the areas of social
perception. The **Test of Social Inference** is a set of 31 pictures depicting a variety of social scenes that involve varying actors in a variety of situations and interactions with their environment. It is administered by accompanying the presentation of pictures with a list of standard questions which elicit interpretations, based on what is pictured, by the examinee. The **Test of Social Inference** is considered to be an achievement test that measures an individual's ability to decode and deal with visually presented social cues in a depicted social situation.

Edmonson, et al., (1971) have described the development of this test. Interscorer reliability in the excess of .90 has been reported from experienced scorers (Edmonson, et al., 1971). In dealing with EMR subjects, test-retest reliability has ranged from .84 to .90 (Edmonson, et al., 1971), with retest coefficients for nonretarded adolescents providing a reliability estimate of approximately .74 (Edmonson, et al., 1971) ranging to a high of .82 in a more recently conducted study using nonretarded junior high school students (De Jung & Edmonson, 1972).

Normative data for the **Test of Social Inference** was obtained from five samples of public school EMR students (N=703), three samples of institutional EMR residents (N=272), and five samples of nonretarded public school students (N=265). Intersample comparisons indicated a gradient of performance extending downwards from the nonretarded subjects, with fewer than 20% of the resident EMR sample scoring above the mean for the non-resident EMR sample, and fewer than 10%
of the retarded portion in either EMR category scored above the mean for the nonretarded sample. It was noted that item difficulty did not seem to vary due to either regional difference or differences in type of residential setting. Other studies also failed to reveal differences for either sex or race (Edmonson, et al., 1974).

Pearson product moment correlation coefficients between Test of Social Inference scores and IQ ranged from upwards of .21 to a high of .61, with a median coefficient of .48 (Edmonson, et al., 1974, p. 10). A Sheffe test of linear trend revealed a greater-than-chance regularity of increased Test of Social Inference means for each higher range of IQ (Edmonson, et al., 1974).

Correlation with age has led to mixed results. Edmonson's (1974) report reveals that a Sheffe comparison of normative adolescent groups failed to yield a significant trend, although a greater-than-chance tendency for Test of Social Inference scores to increase as a function of age was reported.

In a more recent study, Charette (1972) did find clear differences in Test of Social Inference scores for three nonretarded samples of ages 7½, 10½, and 13½. Increases between groups in mean scores all reached significance.

Validation of the Test of Social Inference has proven more difficult, but concurrent validation using correlation between Test of Social Inference scores and subject characteristics has given correlations for such aspects as peer acceptance (r=.51), relation of the Test of Social Inference to the Vineland Social Maturity Scales (r=.51), ratings
of social participation \( r = .61 \), etc. Edmonson, et al. conclude that resultant data "...provide considerable validation evidence for the relevance of Test of Social Inference scores to certain significant dimensions of social functioning," (1974, p. 21).

**ADMINISTRATION AND SCORING PROCEDURES**

After the subjects' mental ages and conservation abilities were determined, they were presented with fourteen cards drawn from the Test of Social Inference. The cards chosen were: K-30, K-30#3, K-30#6, K-30#7, K-30#8, K-30#13, K-30#18, K-30#19, K-30#20, K-30#21, K-30#23, K-30#24, K-30#27, and K-30#29. Subjects were presented each card in the same order as listed here and were asked a series of questions about each card. The questions were drawn directly from the Test of Social Inference Recording Form (Edmonson, et al., 1974). These questions were further supplemented on cards K-30, K-30#7, K-30#8, K-30#13 K-30#18, K-30#19, K-30#21, K-30#23, K-30#24, and K-30#27. On these ten cards the subjects were also questioned about the pictured actor's feelings, and about what had happened to make him or her feel that way (see appendix B). Further, on cards K-30#7, K-30#9, K-30#13, K-30#19, K-30#24 and K-30#27, the subject was asked a third supplemental question about why the actor was acting or performing a given action in the manner he or she did (see appendix B).

These ten of the fifteen total presented cards thereby tested the subject's ability to make an intentional ascription based on facial expression and/or contextual cues. Each of these ten cards also depicted an environmental event that was clearly connected with the
particular emotional response the depicted actor was displaying, and allowed the subject to make the causal connection between the environmental event and the actor's emotional response to it. The final statement was to be in the form, "X felt Y because of Z."

Finally, six of these ten cards also allowed for the examination of the subject's ability to make a causal statement of the form, "X did Y because of Z," where either the environment or an internal emotional and/or intentional state could be substituted for Z. This tested the ability of various subjects to see intentions of the actors pictured as causally connected to the activities in which they engaged.

Total testing for the entire procedure varied from 25 to 40 minutes, depending on subject tested.

SCORING

All of the fourteen cards that were presented were scored according to the criteria set forth on the Test of Social Inference Recording Form. No numeric value was given for card K-30 in the total derived Test of Social Inference score, as it is considered a practice picture. The scores obtained on the other thirteen cards resulted in a possible total of 50 points on this short form of the Test of Social Inference.

Subjects' responses to the total fourteen cards were categorized according to the following:

1. Correct inference - defined as inference that was justified by material depicted in the presented picture.
2. Incorrect inference - defined as an inference that was not justified by pictorially depicted material.

3. Descriptive response - defined as a response that consists of a concrete description of the ongoing action in the picture.

4. Enumerative response - defined as a response that consists of a simple listing of objects pictured.

These categories have been previously utilized by Charette (1972), where the response on each card was categorized as an inference, description or enumeration, based upon whichever was predominant in the child's response. Inferences in her study were also divided into two types, those that were based on correct interpretation of cues pictorially represented and those that were not. I have used the same format for the identification of response types in this study.

As aforementioned, ten of the cards, previously listed, were also scored based on those supplemental questions asked, dealing with 1) the ability to make intentional ascriptions based on facial expressions and contextual cues, 2) the ability to infer the causal relationships between intention ascribed and ongoing social situations which caused it, and 3) the ability to infer a causal relationship between either the actors' intentions or environmental events, and activities in which they engaged. Each of the responses to the three supplemental questions asked was scored either one or zero depending on whether the subject could correctly answer the pertinent question. Thus, for each subject there were ten scored responses to each question, "How does the actor
feel?" or, "Why does he or she feel that way?" (see appendix C). There were six scored responses to the question, "Why did the actor act the way she or he did?" (see appendix C).

As can be seen by appendix C, more than one interpretation or its synonym were accepted on supplemental question number one (i.e., "Why does the actor feel that way?") for card numbers K-30, K-30#7, K-30#13, and K-30#19, since these cards contain ambiguous cues. Thus, on card K-30#7, for example, the old man looks angry but could also be seen as sad or unhappy due to the nature of his life. Another example is card K-30#19, where the mother seems scared, but could also be interpreted as angry over the fact that the boy had brought the turtles into the house when he wasn't supposed to.

On supplemental question two (i.e., "Why does actor feel the way he or she does?") the examiner was not interested in the correctness of the subject's interpretation of what was going on in the environment. Instead, responses were scored on the basis of whether the subject could make a causal connection between his interpretation of what was going on in the environment and the emotion the actor was displaying. The only statement of the form, "Actor X feels emotion Y because of interpreted event Z," that was not accepted as correct was the substitution of a facial expression for Z, as in the statement, "The boy feels happy because he is smiling."

On supplemental question number three (i.e., "Why is the actor behaving in the manner he or she is currently displaying?"), concern over correct content was once again not primary. Rather, the examiner
was interested in whether the subject could make an inferential statement of the form, "Actor X did action Y because of intention and/or event Z."

Finally, after some deliberation, it was decided to include any material garnered through the administration of these supplemental questions in the total Test of Social Inference score given to each subject. This decision somewhat violated the standard format, as material was often gained through the use of these questions on certain cards (e.g., K-30#8, K-30#18, K-30#19, K-30#24, K-30#27) that were scorable under Test of Social Inference manual scoring requirements. It was decided, however, to proceed in this fashion for all subjects involved.

STATISTICAL ANALYSIS

Each subject obtained a total score in a) overall Test of Social Inferences performance as scored according to manual requirements; b) number of enumerative responses; c) number of descriptive responses; d) number of inferences made; e) number of correct inferences made; f) number of misinferences; g) number of correct intentional ascriptions; h) number of inferences made using the structure, "Actor X felt emotion Y due to event Z"; i) number of inferences made using the structure, "Actor X did action Y due to intention or event Z"; j) number of, "X did Y due to Z" responses where an environmental event was substituted for Z; and k) number of "X did Y due to Z" responses where an intention was substituted for Z.
A one-way analysis of variances was applied to the data in each of the above categories to ascertain whether there were significant differences between groups. Thus eleven one-way ANOVA's were run in the study.

In those categories where a significant F ratio was obtained, a post-hoc test of significance was applied in order to establish between what specific groups a significant difference was to be found. The test chosen for this was the Scheffe a posteriori comparison of means two at a time following an F test (Ferguson, 1966). This format, an F test to establish level of significance between groups, followed by the Scheffe to identify between which groups significant difference was displayed, has been used by other researchers in their statistical treatment of similar studies (Charette, 1972; Edmonson, et al., 1974). The Scheffe was further chosen as it is a two tailed test and thus allows for examination of the data without a prior hypothesis as to directionality of effect.
CHAPTER 5

RESULTS

TOTAL TEST OF SOCIAL INFERENCE (TSI) SCORES

In the discussion of results that is to come the reader may want to refer back to Table 1 presented in the last chapter so as to refamiliarize him or herself with the salient factors about experimental groups one through eight, as the same order of identity of group will be maintained in this chapter. Further, an examination of Table 2 will also provide the reader with a typification of the mean and range of chronological and mental age for each group.

The first three hypotheses were concerned with whether or not there would be significant differences between varying groups of subjects in social perception as measured by the Test of Social Inference (TSI).

An inter-rater reliability check on the scoring of this test was conducted with Dr. Barbara Edmonson of the Ohio State University. An inter-rater reliability of 89.9% was obtained with average difference in scores between protocols being less than 1.5 points per protocol.

The distribution of scores on this measure are presented in Table 3. A one-way analysis of variance was conducted on this data and an F score, significant at the .05 level was obtained. This can be found displayed on Table 4.
A Scheffe a posteriori comparison of means two at a time following an F test was applied to the data (Ferguson, 1966, p. 296-297). This comparison found on Table 5, revealed no significant differences between groups one through four and no significant difference between groups five through eight. Groups one through four, however, were all individually significantly lower than each of groups five through eight at the .05 level.

Hypothesis 1, which stated that there is no significant difference in measured social perception, i.e., total TSI scores, among retarded or non-retarded children at different age levels was rejected as significant differences were obtained in both retarded and non-retarded groups with older age groups emerging with significantly higher mean scores than those obtained by younger age groups.

Hypothesis 2, which stated that there is no significant difference between retarded and non-retarded groups in measured social perception, i.e., total TSI scores, when matched for chronological age was rejected as groups five and seven consisting of eight and nine year old subjects of average intelligence obtained significantly higher mean scores than groups two and four, which consisted of eight and nine year old mildly retarded subjects.

Hypothesis 3, which stated that there is no significant difference between retarded and non-retarded groups in measured social perception, i.e., total TSI scores, when matched for mental age and/or conservational level was also rejected, for despite the fact that no significant difference between means of groups five
or seven versus group six or eight was revealed on the initial Scheffe a posteriori comparison of means two at a time, a significant F ratio was obtained, as can be seen on Table 36, when groups five and seven were combined and compared to a combination of six and eight. This combining of groups resulted in two groups consisting of a group of 24 nonretarded subjects with a mental age of eight to nine and a group of 24 mildly retarded subjects with a mental age of eight to nine. As a significant difference was obtained between retarded and nonretarded subjects of the same mental age based on the combining of groups, it was felt that Hypothesis 3 could be safely discarded.
### TABLE 2

**CHRONOLOGICAL AND MENTAL AGE MEANS AND SCORE RANGES**

FOR 48 NON-MENTALLY RETARDED AND 48 MENTALLY RETARDED SUBJECTS

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**EVEN NUMBER = MR SUBJECTS**

**ODD NUMBER = NON MR SUBJECTS**
TABLE 3

DISTRIBUTION OF TOTAL TSI SCORES

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### TABLE 4

**SUMMARY OF ANALYSIS OF VARIANCE OF TOTAL TSI SCORES**

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**NOTE:** 2.11 IS THE TABLED F AT .05 LEVEL
TABLE 5

SCHEFTE CRITICAL DIFFERENCE

BY MEANS OF TOTAL TSI SCORES

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SCHEFTE CRITICAL DIFFERENCE B/MEANS = 7.1728
RESPONSE FREQUENCIES BY TYPE ON THE TSI

Hypotheses 4, 5, and 6 were concerned with whether or not these would be significant differences between various groups in frequencies of differing types of responses. These response types were respectively typified as enumeration, description, and inference, the last of which was subsequently also examined in terms of whether the inferences the subject made were justified by the pictorial content that they were based upon. The distribution of scores for each of these categories is represented on Tables 6 through 10.

A one-way analysis of variance was conducted on the total frequency data for each of the five categories of responses cited, i.e., enumerative, descriptive, inferential, incorrect inferential, and correct inferential. These analyses can be found in Tables 11 through 15. A significant F was obtained for each of the five categories of response at the .05 level.

A Scheffe a posteriori comparison of means two at a time following an F test was also applied to the total frequency data for each category of response. The results of these analyses can be found in Tables 16 through 20.

In looking at the data it can be seen that the F ratio for enumerative responses (Table 11) just reached significance. The Scheffe a posteriori comparison of means (Table 16) revealed no significant difference between individual groups. However, it would appear that a difference was readily discernible between groups one
through four representing the younger age groups sharing a mental age of approximately five versus groups five through eight, who were older and shared a mental age of approximately eight to nine, as enumerative responses were given by 29% of the younger subjects of average intelligence and by 42% of the younger mentally retarded subjects, while none were given by the older groups.

A more significant F ratio was derived from the ANOVA conducted on the frequency data of those responses defined as descriptive (Table 7). A Scheffe a posteriori comparison of means (Table 17) revealed significant differences when groups five and seven were compared to groups one and three. The mean for group seven was also significantly lower than those obtained for groups two and four. A second set of Scheffe comparisons of means was also conducted on this data using various group combinations. An analysis of combined means of groups five and seven (average IQ, CA 8-9) when compared to combined scores of groups two and four (mildly delayed, CA 8-9) yielded a significant F ratio (Table 36). Other analyses of combined means that did not yield significance can be found on Table 37.

The one-way ANOVA conducted on the frequency data of those responses defined as inferential was very significant as can be seen by Table 13. The Scheffe a posteriori comparison of means conducted on this data (Table 18) revealed that both groups five and seven had significantly higher means on this measure than groups one through four. A second set of Scheffe comparisons of means was
also conducted to see if significance could be reached between various combinations of groups of interest that had failed to achieve a significant difference when compared individually. None of these analyses yielded significant results, as can be found on Table 37.

The one-way ANOVA conducted on the frequency data of those responses defined as incorrect inferences or misinferences just reached significance, as can be seen by Table 14. No significant differences, however, were found on any Scheffe a posteriori comparison of individual group (Table 19) or combined group (Table 37) means.

The one-way ANOVA conducted on the frequency data of the responses defined as correct inferential was very highly significant, as can be seen by Table 10. A Scheffe a posteriori comparison of means conducted on this data (Table 20) revealed that each of groups five through eight were significantly higher than individual groups one through four. A Scheffe a posteriori comparison of means was also conducted to see if significance could be reached between a combination of groups five and seven (average IQ, MA 8-9) when compared to a combination of groups six and eight (mildly delayed, MA 8-9). As can be seen on Table 36, a significant F ratio on this analysis was obtained.

Hypothesis 4, which stated that there would not be significant differences between retarded or nonretarded groups of different chronological ages when compared according to frequency of various
response categories displayed on the TSI, was rejected with qualifications. It was rejected on the grounds that nonretarded groups of different chronological ages showed a significant increase in the number of total inferences and correct inferences, while displaying a significant decrease in descriptive responses, with a complete cessation of enumerative responses occurring as one progressed from the younger to the older age groups.

The mildly retarded groups displayed a significant increase in correct inferences over age, as well as a cessation of enumerative responses between the younger versus the older age groups. These groups, however, failed to demonstrate a significant increase in the total number of descriptive responses made at different chronological levels.

Finally, neither the retarded nor the nonretarded groups displayed a significant difference in mean number of misinferences displayed as one passed from the younger to the older age groups.

Hypothesis 5, which stated that there is no significant difference between groups of retarded and nonretarded subjects matched for chronological age when compared according to frequency of various response categories displayed on the TSI, was rejected as a clearly significant difference between average IQ and mildly delayed groups was demonstrated in regards to the relative frequency of the total number of inferences made, the number of correct inferences made, and the number of descriptive responses made. The nonretarded groups of the same chronological age were significantly higher in mean number of both total inferences and correct inferences made, while
being significantly lower in mean number of descriptive responses made. Comparison of mean number of enumerative responses between groups also approached significance. No significant difference, however, was obtained between groups for mean number of misinferences displayed.

Hypothesis 6, which stated that there is no significant difference between retarded and nonretarded groups matched for either mental age or operational level when compared according to the frequency of various response categories displayed on the TSI, was also rejected, since a Scheffe, combining groups five and seven while comparing them with combined groups six and eight, did reveal a significantly higher incidence of correct inferences in the non-retarded groups of a similar mental age. This rejection, however, is made with the qualification that groups one and three versus groups two and four showed no significant difference on any measure. Also, combined groups five and seven when compared on other response categories with combined groups six and eight failed to display any significant difference between retarded and non-retarded groups of the same mental age in the categories of enumeration, description, total inferences, and misinferences.
### TABLE 6

**DISTRIBUTION OF NUMBER OF ENUMERATIONS ON THE TSI**

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**Distribution of Number of Total Inferences Scored on the TSI**

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TABLE 9
DISTRIBUTION OF TOTAL NUMBER OF MISINFERENCES ON THE TSI

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TABLE 10

DISTRIBUTION OF NUMBER OF CORRECT INFERENCES ON THE TSI

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<tr>
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<th>3</th>
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### TABLE 11

SUMMARY OF ANALYSIS OF VARIANCE
OF TOTAL ENUMERATIONS ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARE</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
<td>7</td>
<td>11.073</td>
<td>1.582</td>
<td>2.58</td>
</tr>
<tr>
<td>ERROR</td>
<td>88</td>
<td>53.917</td>
<td>0.613</td>
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<tr>
<td>TOTAL</td>
<td>95</td>
<td>64.990</td>
<td></td>
<td></td>
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</table>

**NOTE:** 2.11 IS THE TABLED F AT .05 LEVEL
### TABLE 12
SUMMARY OF ANALYSIS OF VARIANCE
OF TOTAL DESCRIPTIONS ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARE</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
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<td>294.41</td>
<td>42.06</td>
<td>11.62</td>
</tr>
<tr>
<td>ERROR</td>
<td>88</td>
<td>318.58</td>
<td>3.62</td>
<td></td>
</tr>
<tr>
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<td>612.99</td>
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<td></td>
</tr>
</tbody>
</table>

**NOTE:** 2.11 is the tabled F at .05 level
<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARE</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
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<td>401.96</td>
<td>57.42</td>
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<td>322.67</td>
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NOTE: 2.11 IS THE TABLED F AT .05 LEVEL
### Table 14

**Summary of Analysis of Variance**

**Of Total Misperceptions on the TSI**

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
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<tr>
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<td>5.83</td>
<td>2.97</td>
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<td>Error</td>
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<td>1.97</td>
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<td>Total</td>
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<td>213.83</td>
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</table>

**Note:** 2.11 is the tabled F at .05 level
TABLE 15

SUMMARY OF ANALYSIS OF VARIANCE OF TOTAL CORRECT INFERENCES ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
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<th>MEAN SQUARE</th>
<th>F</th>
</tr>
</thead>
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<tr>
<td>FACTOR</td>
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<td>538.96</td>
<td>76.99</td>
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NOTE: 2.11 IS THE TABLED F AT .05 LEVEL
TABLE 16

SCHEFFE CRITICAL DIFFERENCE BY MEANS

OF TOTAL ENUMERATIONS ON THE TSI

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<thead>
<tr>
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<th>NUMBER</th>
<th>MEAN</th>
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</table>

SCHEFFE CRITICAL DIFFERENCE B/MEOANS = 1.2284
TABLE 17
SCHEEFF CRITICAL DIFFERENCE BY MEANS OF TOTAL DESCRIPTIONS ON THE TSI

| 1  | 12 | 7.417 | 2.575 |
| 2  | 12 | 5.583 | 1.240 |
| 3  | 12 | 7.000 | 2.089 |
| 4  | 12 | 5.917 | 1.929 |
| 5  | 12 | 3.000 | 2.045 |
| 6  | 12 | 4.583 | 2.021 |
| 7  | 12 | 2.000 | 1.279 |
| 8  | 12 | 4.417 | 1.676 |

SCHEEFF CRITICAL DIFFERENCE B/MEDANS = 2.9852
<table>
<thead>
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<tr>
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<td>5.750</td>
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<tr>
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<tr>
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<td>12</td>
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<td>2.021</td>
</tr>
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<td>7</td>
<td>12</td>
<td>12.000</td>
<td>1.279</td>
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<td>1.676</td>
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SCHEFFE CRITICAL DIFFERENCE B/MEANS = 3.0057
# TABLE 19

**Scheffe Critical Difference by**

**Means of Total Misinferences on the TSI**

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<td>3.000</td>
<td>1.044</td>
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<td>1.832</td>
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<td>0.996</td>
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**Scheffe Critical Difference B/Means = 2.2022**
TABLE 20

Scheffe Critical Difference by Means
Of Total Correct Inferences on the TSI

<table>
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<th>NUMBER</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
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<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>2.917</td>
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<td>3.833</td>
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<td>12</td>
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<td>12</td>
<td>6.833</td>
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Scheffe Critical Difference B/Means = 2.6811
FREQUENCY OF CORRECT INTENTIONAL ASCRIPTIONS

The results to be discussed in this and the next section were generated through the use of supplemental questions appearing in Appendix B. The results appearing in this and the next section deal with subjects' ability to make emotional ascriptions and to generate several forms of causal inferences. These were scored according to the criteria found in Appendix C. An interrater reliability check that was conducted on this scoring system yielded a 98.6 correlation between scorers.

Hypotheses 7 and 8 were concerned with whether or not there would be significant differences between various groups of retarded and non-retarded subjects in ability to make correct intentional ascriptions based on pictorial cues when matched for either chronological or mental age. The distribution of scores for this measure can be found on Table 21.

A one-way ANOVA was conducted on the data generated for this measure (Table 22), and it resulted in a significant F ratio at the .05 level.

A Scheffe a posteriori comparison of means two at a time following an F test was then applied to the data. The results of this analysis can be found on Table 23.

In looking at Table 23, it can be seen that groups five and seven both displayed significantly higher derived mean scores than group two. By combining various groups and conducting Scheffes on the resultant data, significance was found for the following sets of mean
comparisons: combined means five and seven were significantly higher than combined means two and four, and combined means one and three were significantly higher than combined means two and four. These results can be found on Table 36.

Hypothesis 7, which stated that there is no significant difference between retarded and nonretarded groups in their ability to make intentional ascriptions based on facial expressions when groups are matched for chronological age, was rejected as significant differences were obtained between groups five and seven (average IQ, CA 8-9) and groups two and four (mildly delayed, CA 8-9).

Hypothesis 8, which stated that there is no significant difference between retarded and nonretarded groups in their ability to make intentional ascriptions based on facial expressions when matched for mental age and/or operational level, was also rejected with qualifications, as despite the fact that significant differences between retarded and nonretarded groups did not emerge when combined on the basis of a shared mental age of eight to nine years (Table 37), a significant difference did emerge when groups were combined at a mental age of five years (Table 36).
**TABLE 21**

**DISTRIBUTION OF NUMBER OF CORRECT INTENTIONAL ASCRIPTIONS ON THE TSI**

<table>
<thead>
<tr>
<th>GROUP</th>
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</table>
### TABLE 22
SUMMARY OF ANALYSIS OF VARIANCE OF TOTAL CORRECT INTENTIONAL ASCRPTIONS ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARE</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
<td>7</td>
<td>50.906</td>
<td>7.272</td>
<td>9.81</td>
</tr>
<tr>
<td>ERROR</td>
<td>88</td>
<td>65.250</td>
<td>0.741</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>95</td>
<td>116.156</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** 2.11 is the tabled F at .05 level
### TABLE 23

SCHEFFE CRITICAL DIFFERENCES BY MEANS

OF TOTAL ASCRIPITIONS ON THE TSI

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>8.833</td>
<td>0.718</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>7.583</td>
<td>1.084</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>8.750</td>
<td>1.138</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>8.083</td>
<td>0.900</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>9.667</td>
<td>0.492</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>9.250</td>
<td>0.866</td>
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<td>7</td>
<td>12</td>
<td>9.917</td>
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</tr>
<tr>
<td>8</td>
<td>12</td>
<td>9.167</td>
<td>1.030</td>
</tr>
</tbody>
</table>

SCHEFFE CRITICAL DIFFERENCE B/MEANS = 1.3506
EXAMINATION OF FREQUENCY OF INFERENTIAL FORMS GENERATED

Causal Connection: Event Causes Emotion

Hypotheses 9, 10, and 11 were concerned with whether or not a significant difference between various groups would emerge in the ability to generate causal inferences of the form, "Actor X feels emotion Y because of event Z." The distribution of scores for this measure can be found on Table 24.

A one-way analysis of variance was conducted on the data generated for the measure (Table 25). It resulted in a significant F ratio at the .05 level.

A Scheffe a posteriori comparison of means two at a time following an F test was then applied to the data. The results of this analysis can be found on Table 26.

In looking at Table 26, it can be seen that groups five and seven both displayed significantly higher mean score than groups one and three. A variety of comparisons of combined group means of interest were attempted, but all of these failed to reach significance. These can be found on Table 37.

Hypothesis 9, which stated that there is no significant difference between retarded or nonretarded groups of different chronological ages in their ability to generate causal inferences of the form, "Actor X feels emotion Y because of event Z," was rejected as significant differences in mean scores with increases in chronological age did emerge for children of average intellectual functioning.
### TABLE 24

**DISTRIBUTION OF NUMBER OF INFERENCES OF FORM X FEEL Y BECAUSE OF Z ON THE TSI**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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</thead>
<tbody>
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<td>SUBJECT</td>
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<td>4</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>10</td>
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<td>8</td>
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<td>SUBJECT</td>
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<td>6</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT</td>
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<td>4</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>7</td>
<td>10</td>
<td>9</td>
</tr>
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<td>SUBJECT</td>
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<td>6</td>
<td>8</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>9</td>
</tr>
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<td>SUBJECT</td>
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<td>8</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT</td>
<td>6</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>SUBJECT</td>
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<td>10</td>
<td>8</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT</td>
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<td>7</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT</td>
<td>10</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>7</td>
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<td>7</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT</td>
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<td>10</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT</td>
<td>12</td>
<td>1</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>
TABLE 25

SUMMARY OF ANALYSIS OF VARIANCE OF TOTAL INERENCE OF FORM X FEELS Y BECAUSE OF Z ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARES</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
<td>7</td>
<td>157.99</td>
<td>22.57</td>
<td>4.81</td>
</tr>
<tr>
<td>ERROR</td>
<td>88</td>
<td>413.25</td>
<td>4.70</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>95</td>
<td>571.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: 2.11 IS THE TABLED F AT .05 LEVEL
TABLE 26

SCHEFFE CRITICAL DIFFERENCE BY MEANS OF
TOTAL INFERENCE OF FORM X FEELS
Y BECAUSE OF Z ON THE TSI

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>6.000</td>
<td>3.104</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>7.417</td>
<td>2.151</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>6.083</td>
<td>2.968</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>7.417</td>
<td>2.466</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>9.500</td>
<td>0.905</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>8.583</td>
<td>1.311</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
<td>9.583</td>
<td>0.669</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>7.833</td>
<td>2.329</td>
</tr>
</tbody>
</table>

SCHEFFE CRITICAL DIFFERENCE B/MEANS = 3.4014
Hypothesis 10, which stated that there is no significant difference between retarded and nonretarded subjects in their ability to generate causal inferences of the form, "Actor X feels emotion Y because of event Z," was accepted as no significant difference between groups matched for chronological age emerged (Table 37).

Hypothesis 11, which stated that there is no significant difference between retarded and nonretarded in their ability to generate causal inferences of the form, "Actor X feels emotion Y because of event Z," when matched for mental age, was also accepted as no significant differences between groups matched for mental age and/or operational level emerged (Table 37).

Causal Connection Between Action and Causal Determinant

Hypotheses 12, 13, and 14 were concerned with whether or not a significant difference between various groups would emerge in the ability to generate causal inferences of the form, "Actor X did action Y because of Z," where tabulation of results was not concerned with whether an event or intentional state is substituted for Z. The distribution of scores on this measure can be found on Table 27.

A one-way Scheffe a posteriori comparison of means two at a time following an F test was then applied to the data. The results of this analysis can be found on Table 29.
A significant difference was obtained when combined groups five and seven (average IQ, CA 8-9) were compared to combined groups two and four (mildly retarded, CA 8-9), as can be seen on Table 36. Other combined group comparisons that did not reach significance can be found on Table 37.

Hypothesis 12, which stated that there is no significant difference between retarded or nonretarded groups of different chronological ages in their ability to generate causal inferences of the form, "Actor X did action Y because of Z," was rejected. Significant differences were obtained between groups of average intellectual ability of different chronological ages. An important qualification to this is that although such differences did emerge for average populations, differences between retarded subjects of different chronological ages did not emerge (Table 37).

Hypothesis 13, which stated that there is no significant difference between retarded and nonretarded groups in their ability to generate causal inferences of the form, "Actor X did Y because of Z," when matched for chronological age, was rejected as a significant difference was obtained between combined groups five and seven when compared to combined groups two and four (Table 36).

Hypothesis 14, which stated that there is no significant difference between retarded and nonretarded groups in ability to generate causal inferences of the form, "Actor X did action Y because of Z," when matched for mental age was accepted. No significant differences between retarded and nonretarded groups matched for mental age and/or operational level were found on this measure (Table 37).
<table>
<thead>
<tr>
<th>GROUP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
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<td>3</td>
<td>4</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>SUBJECT 2</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6</td>
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<td>4</td>
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<td>0</td>
</tr>
<tr>
<td>SUBJECT 4</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>SUBJECT 5</td>
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<td>6</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 6</td>
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<td>5</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 7</td>
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<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
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<td>5</td>
</tr>
<tr>
<td>SUBJECT 8</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>SUBJECT 9</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
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<tr>
<td>SUBJECT 10</td>
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<td>4</td>
<td>5</td>
<td>0</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>SUBJECT 11</td>
<td>4</td>
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<td>4</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>SUBJECT 12</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>
TABLE 28
SUMMARY OF ANALYSIS OF VARIANCE OF
TOTAL INFERENCES OF FORM X DID Y
BECAUSE OF Z ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARES</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
<td>7</td>
<td>131.33</td>
<td>18.76</td>
<td>7.72</td>
</tr>
<tr>
<td>ERROR</td>
<td>88</td>
<td>214.00</td>
<td>2.43</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>95</td>
<td>345.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: 2.11 IS THE TABLED F AT .05 LEVEL
TABLE 29

Scheffé Critical Differences by Means

Of Total Inferences of Form X

Did Y Because of Z on the TSI

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>2.417</td>
<td>1.676</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>3.500</td>
<td>1.508</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>3.000</td>
<td>2.132</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>3.250</td>
<td>2.179</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>5.750</td>
<td>0.452</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>4.667</td>
<td>1.303</td>
</tr>
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<td>7</td>
<td>12</td>
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<tr>
<td>8</td>
<td>12</td>
<td>4.333</td>
<td>1.670</td>
</tr>
</tbody>
</table>

Scheffé Critical Difference B/Mean = 2.4458
Causal Connection Between Action and Causal Environmental Event

Hypotheses 15, 16, and 17 were concerned with whether or not a significant difference between various groups would emerge in the ability to generate causal inferences of the form, "Actor X did action Y because of Z," where a specific environmental event is substituted for Z. The distribution of scores on this measure can be found on Table 30.

A one-way analysis of variance was conducted on the data generated for this measure (Table 31). It resulted in an insignificant F at the .05 level. A Scheffe a posteriori comparison of means two at a time following an F test also failed to reveal any significance between groups (Table 32).

Hypothesis 15, which stated that there is no significant difference between retarded or nonretarded groups of different chronological ages in their ability to generate causal inferences of the form, "Actor X did action Y because of event Z," was accepted as no significant differences between groups was discovered.

Hypothesis 16, which stated that there is no significant difference between retarded and nonretarded groups in their ability to generate causal inferences of the form, "Actor X did action Y because of event Z," when matched for chronological age was accepted, as no significant differences between groups was discovered.

Hypothesis 17, which stated that there is no significant difference between retarded and nonretarded groups in their ability to generate causal inferences of the form, "Actor X did Y because of
event Z, when matched for mental age and/or operation level was accepted, as no significant differences between groups was discovered.
TABLE 30
DISTRIBUTION OF NUMBER OF INFERENCES OF FORM
X DID Y BECAUSE OF EVENT Z ON TSI

<table>
<thead>
<tr>
<th>GROUP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
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<td>0</td>
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<td>3</td>
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<td>3</td>
</tr>
<tr>
<td>SUBJECT 8</td>
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<td>4</td>
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<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>SUBJECT 9</td>
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<td>0</td>
<td>0</td>
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<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
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<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<td>SUBJECT 11</td>
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<td>1</td>
<td>1</td>
<td>0</td>
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<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
TABLE 31
SUMMARY OF ANALYSIS OF VARIANCE OF
TOTAL INFERENCE OF FORM X DID Y
BECAUSE OF EVENT Z ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARE</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
<td>7</td>
<td>9.07</td>
<td>1:30</td>
<td>1.16</td>
</tr>
<tr>
<td>ERROR</td>
<td>88</td>
<td>98.58</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>95</td>
<td>107.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: 2.11 IS THE TABLED F AT .05 LEVEL
TABLE 32

SCHIEFFE CRITICAL DIFFERENCES BY MEANS

OF TOTAL INFERENCES OF FORM X DID

Y BECAUSE OF EVENT Z ON THE TSI

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>1.3333</td>
<td>1.3707</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>1.0833</td>
<td>0.6686</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>1.1667</td>
<td>1.0299</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>1.4167</td>
<td>1.5050</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>1.4167</td>
<td>0.9003</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>1.5833</td>
<td>1.1645</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
<td>0.8333</td>
<td>0.7177</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>1.9167</td>
<td>0.7930</td>
</tr>
</tbody>
</table>

SCHIEFFE CRITICAL DIFFERENCE B/MEANS = 1.6604
Causal Connection Between Action and Intentional Determinates

Hypotheses 18, 19, 20 and 21, were concerned with whether or not there would be significant differences between various groups on their ability to generate causal inferences of the form, "Actor X did action Y because of intention and/or emotion Z." The distribution of scores on this measure can be found on Table 33.

A one-way analysis of variance was conducted on the data generated for this measure (Table 34). It resulted in a significant F at the .05 level.

A Scheffe a posteriori comparison of means two at a time following an F test was then applied to the data. The results of this analysis can be found on Table 35.

In looking at Table 35, it can be seen that groups five and seven had significantly higher mean scores than groups one, three, four, and eight. Group five was also significantly higher than group two, with group seven just missing significance in comparison to group two. A variety of comparisons of combined group means of interest were also attempted. A significant difference was obtained when combined groups five and seven (average IQ, CA 8-9) were compared with combined groups two and four (mildly retarded, CA 8-9) as can be seen on Table 36. This table also shows that significant differences were obtained when combined groups five and seven (average IQ, MA 8-9) were compared to combined groups six and eight (mildly retarded, MA 8-9). Other combined group comparisons in this measure that did not reach significance can be found on Table 37.
Hypothesis 18, which stated that there is no significant difference between retarded or nonretarded groups of different chronological ages in their ability to generate causal inferences of the form, "Actor X did action Y because of emotion or intention Z," was rejected as groups five and seven demonstrated significantly higher scores than groups one and three (Table 35). Thus a clear difference between groups at different chronological ages emerged on this measure in dealing with populations of average intelligence. No such differences emerged in comparing retarded groups of subjects (Table 37).

Hypothesis 19, which stated that there is no significant difference between groups of retarded and nonretarded subjects in ability to generate causal statements of the form, "Actor X did action Y because of intention or emotion Z," when matched for chronological age was rejected as combined groups five and seven scored significantly higher than combined groups two and four on this measure (Table 36).

Hypothesis 20, which stated that there is no significant difference between groups of retarded and nonretarded subjects when matched for mental age or operational level, in the ability to make causal statements of the form, "Actor X did action Y because of intention or emotion Z," was rejected, as significant differences between a combination of groups five and seven (average IQ, MA 8-9) when compared to a combination of groups six and eight were found (Table 36).

Hypothesis 21, which stated that there is no significant difference between groups composed of pre-operational versus concrete operational subjects in the ability to generate causal statements of the form,
"Actor X did action Y because of intention or emotion Z," when said groups share a common mental and chronological age was accepted. No significant differences were found on this measure when group six, consisting of 12 to 14 year old mildly delayed nonconservers, was compared with group eight, which consisted of 12 to 14 year old mildly delayed conservers.
TABLE 33

DISTRIBUTION OF NUMBER OF INFERENCES OF FORM

X DID Y BECAUSE OF INTENTION OR EMOTION Z ON THE TSI

<table>
<thead>
<tr>
<th>GROUP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECT 1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>SUBJECT 3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>SUBJECT 4</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 5</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>SUBJECT 6</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>SUBJECT 7</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>SUBJECT 8</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 9</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 10</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>SUBJECT 11</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 12</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>
TABLE 34

SUMMARY OF ANALYSIS OF VARIANCE OF
TOTAL INFERENCES OF FORM X DID Y
BECAUSE OF INTENTION OR EMOTION Z ON THE TSI

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>DEGREES OF FREEDOM</th>
<th>SUM OF SQUARES</th>
<th>MEAN SQUARE</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACTOR</td>
<td>7</td>
<td>145.99</td>
<td>20.86</td>
<td>12.80</td>
</tr>
<tr>
<td>ERROR</td>
<td>88</td>
<td>143.42</td>
<td>1.63</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>95</td>
<td>289.41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: 2.11 IS THE TABLED F AT .05 LEVEL
TABLE 35

SCHEFFE CRITICAL DIFFERENCES BY MEANS

OF TOTAL INFERENCES OF FORM X DID Y

BECAUSE OF INTENTION OR EMOTION Z ON THE TSI

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>1.417</td>
<td>0.996</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>2.250</td>
<td>1.055</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>1.750</td>
<td>1.603</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>1.750</td>
<td>1.865</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td>4.250</td>
<td>0.866</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>3.083</td>
<td>1.564</td>
</tr>
<tr>
<td>7</td>
<td>12</td>
<td>5.083</td>
<td>0.793</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>2.167</td>
<td>1.030</td>
</tr>
</tbody>
</table>

SCHEFFE CRITICAL DIFFERENCE B/MEANS = 2.0031
### TABLE 36

**SIGNIFICANT F RATIOS OBTAINED BETWEEN COMBINED GROUPS**

<table>
<thead>
<tr>
<th>TABLE</th>
<th>GROUPS</th>
<th>F RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5,7 vs. 6,8</td>
<td>2.116</td>
</tr>
<tr>
<td>17</td>
<td>5,7 vs. 6,8</td>
<td>2.755</td>
</tr>
<tr>
<td>20</td>
<td>2,4 vs. 5,7</td>
<td>5.001</td>
</tr>
<tr>
<td>23</td>
<td>1,3 vs. 2,4</td>
<td>2.122</td>
</tr>
<tr>
<td>23</td>
<td>2,4 vs. 5,7</td>
<td>4.369</td>
</tr>
<tr>
<td>29</td>
<td>2,4 vs. 5,7</td>
<td>3.976</td>
</tr>
<tr>
<td>35</td>
<td>2,4 vs. 5,7</td>
<td>7.480</td>
</tr>
<tr>
<td>35</td>
<td>5,7 vs. 6,8</td>
<td>4.385</td>
</tr>
</tbody>
</table>

**NOTE:** 2.11 IS THE TABLED F AT .05 LEVEL
### TABLE 37
NONSIGNIFICANT F RATIOS OBTAINED BETWEEN COMBINED GROUPS

<table>
<thead>
<tr>
<th>TABLE</th>
<th>GROUPS</th>
<th>F RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1,3 vs 5,7</td>
<td>1.245</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 6,8</td>
<td>1.093</td>
</tr>
<tr>
<td>17</td>
<td>1,3 vs 2,4</td>
<td>1.007</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 6,8</td>
<td>.739</td>
</tr>
<tr>
<td></td>
<td>5,7 vs 6,8</td>
<td>1.894</td>
</tr>
<tr>
<td>18</td>
<td>1,3 vs 2,4</td>
<td>1.052</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 6,8</td>
<td>1.644</td>
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<tr>
<td></td>
<td>5,7 vs 6,8</td>
<td>1.869</td>
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<tr>
<td>19</td>
<td>1,3 vs 2,4</td>
<td>1.023</td>
</tr>
<tr>
<td></td>
<td>1,3 vs 5,7</td>
<td>.123</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 5,7</td>
<td>1.855</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 6,8</td>
<td>1.455</td>
</tr>
<tr>
<td></td>
<td>5,7 vs 6,8</td>
<td>.024</td>
</tr>
<tr>
<td>20</td>
<td>1,3 vs 2,4</td>
<td>.102</td>
</tr>
<tr>
<td>23</td>
<td>5,7 vs 6,8</td>
<td>.786</td>
</tr>
<tr>
<td>TABLE</td>
<td>GROUPS</td>
<td>F RATIO</td>
</tr>
<tr>
<td>-------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>26</td>
<td>1,3 vs 2,4</td>
<td>.690</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 5,7</td>
<td>1.648</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 6,8</td>
<td>.229</td>
</tr>
<tr>
<td></td>
<td>5,7 vs 6,8</td>
<td>.649</td>
</tr>
<tr>
<td>29</td>
<td>1,3 vs 2,4</td>
<td>.313</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 6,8</td>
<td>.892</td>
</tr>
<tr>
<td></td>
<td>5,7 vs 6,8</td>
<td>1.101</td>
</tr>
<tr>
<td>35</td>
<td>1,3 vs 2,4</td>
<td>.183</td>
</tr>
<tr>
<td></td>
<td>2,4 vs 6,8</td>
<td>.411</td>
</tr>
</tbody>
</table>

NOTE: 2.11 IS THE TABLED F AT .05 LEVEL
EXAMINATION OF MATCHING FOR MENTAL AGE VERSUS OPERATIONAL LEVEL

Hypothesis 22, was concerned with whether or not there would be significant differences between subjects grouped on the basis of mental age versus those grouped on the basis of conservational ability on any of the measures cited in this experiment. Hypothesis 22 stated that there would be no significant differences on any measure between groups so constructed and it was accepted as no such differences were found.
CHAPTER 6

DISCUSSION AND IMPLICATIONS

This study was designed to examine the similarities and differences in social perception between retarded and nonretarded populations, when matched on such measures as chronological age, mental age, and ability to conserve. The findings were fairly extensive and so will be examined by area in the discussion that is to follow.

ANALYSIS OF FINDINGS: TOTAL TSI PERFORMANCE

The findings garnered from this study fully support the relationship found by Charette (1972) in nonretarded samples, regarding the relationship between TSI group means and age. As in the Charette study, a clearly significant increase in mean TSI scores occurred as a function of increasing chronological age in groups composed of subjects of average intelligence. This finding also held for retarded populations, as a significant increase in mean TSI scores occurred in the older retarded age groups.

The findings generated in this study based on total TSI scores also replicated Edmonson, et al.'s (1971) findings that retarded performers, when compared with children of average intelligence of the same chronological age, are significantly much poorer in their overall performance on the TSI. Further, in the older age groups that participated in this study, it was found that adolescent...
retarded performers displayed significantly poorer mean scores on the TSI than did nonretarded subjects, who shared a similar mental age. These findings bear out Greenspan's conclusion that retarded performers are clearly deficient in the area of social inference tapped by the TSI when compared to children of average mental capabilities. Further, they point to the fact that matching retarded and nonretarded performers on the basis of mental age does not insure that the retarded performers, as a group, will not be significantly poorer in the area of social inference.

ANALYSIS OF FINDINGS: RESPONSE TYPES AND FREQUENCIES

In this section we will examine those findings that pertain to similarities and differences between retarded and nonretarded groups in the pattern of response types generated on the TSI. In the discussion to come we will also give an analysis of why the retarded performer's total TSI performance lags behind that of the nonretarded performer, due to the relative frequencies of the types of response predominate in each group.

As the reader may remember, Edmonson, et al. (1971) held that the retarded performer's problem in social situations that required inferential abilities probably arose due to 1) a failure to discriminate socially relevant material from socially irrelevant material, and 2) a failure to classify or categorize incoming information as well as nonretarded individuals. However, no actual analysis of the nature of the problem inherent in the retarded subject's performance on the TSI was attempted in their study.
Due to the fact that an actual comparative analysis of the retarded versus nonretarded individual's performance on the TSI was not conducted, it was decided to draw upon Charette's (1972) categories of possible response in order to conduct such an analysis.

Charette (1971) in her study which dealt with only children of average intelligence, discovered the following progression in the examination of the relative frequency of various response types generated by children of different age groups: enumeration, which occurred infrequently in the youngest groups, ceased by age seven; description increased up to age seven and then decreased thereafter; and increase in the use of inference corresponded with increase in age.

The findings set forth in this study tend to replicate Charette's (1972), as with increase in age there was a decidedly significant increase both in the number of total inferences and correct inferences generated, with an accompanying decrease in descriptions and a complete cessation of enumerative responses in subjects of average intelligence.

Charette's (1972) findings were also replicated in the examination of the comparison of the relative frequency of misinferences between younger and older age groups. Charette (1972) failed to find a significant difference in the number of misinferences made between groups of different chronological ages. This paralleled Estvan and Estvan's (1959) findings that older children tend to focus on a greater number of aspects of the pictures presented and thus
expose themselves to greater possibilities of misinterpretation. A similar inability to detect a significant difference between groups of different chronological ages in number of misinferences made also occurred in this study.

In examining differences in response frequencies in retarded groups of different chronological ages, a significant increase in correct responses also occurred with increased age, as well as a cessation of enumerative responses. These groups, however, failed to attain a significant difference between younger and older age groups in the number of total inferences or descriptions generated. In examining the data, however, it can be seen that the younger retarded groups were initially higher in number of inferences generated and lower in the number of descriptive responses given than the younger groups of nonretarded subjects, probably due to their greater chronological age. This advantage, however, disappeared in the older age groups as the retarded subjects displayed fewer inferences and more descriptions than the nonretarded groups. None of these differences between retarded and nonretarded groups reached significance. They did result, however, in a nonsignificant difference between younger and older retarded age groups, despite the fact that the trend of relative frequencies of response type between younger and older age groups was in the same direction as found in the nonretarded population.

Leaving the discussion of changes in various response frequencies as a function of chronological age, we are now in a position to apply
this analysis of frequency of response types displayed on the TSI to the performance of retarded subjects matched with groups of nonretarded subjects on the basis of chronological age, mental age, and or conservational level.

In comparing retarded and nonretarded subjects of the same chronological age, it becomes readily apparent from the data that the retarded subject, as a rule, was significantly less apt to generate an inference about what was going on in a situation, relying instead on more primitive responses such as description or enumeration. Further, of those inferences that were generated by the retarded subjects (CA 8-9), over 50% of the inferences made were incorrect, as opposed to approximately 20% of those generated by nonretarded subjects of the same chronological ages. Thus, not only were the retarded subjects significantly less likely to make an inference based on stimuli in the depicted social situation than their same aged nonretarded peers, but they were also far more likely to be mistaken in any inferences that they did generate about what was going on.

The above findings clearly point to the fact that Edmonson et al.'s (1971) original analysis of why retarded subjects score, as a group, significantly lower than nonretarded peers of the same chronological age stands in need of some modification. Although the higher percentage of misinferences displayed by retarded performers may well be accounted for by either a failure to discriminate socially relevant material and/or to efficiently categorize or appropriately classify incoming information, these theorized reasons for their poorer showing do not account for the significantly lower incidence of inferences, and
significantly higher incidence of developmentally more primitive responses (i.e., descriptive and enumerative), generated by chronologically equivalent groups of retarded subjects. Thus, Edmonson et al.'s (1972) reasons for the poorer performance of the retarded subject when compared to a chronologically same aged peer stand as insufficient, as a third reason for lower exhibited scores by retarded performers is needed. This third reason is the fact that the retarded performer exhibits a greater tendency to make noninferential descriptive and, at the younger age levels, enumerative responses, and thus generally produces fewer scorable inferences about what is going on in a social situation.

Turning to an examination of the comparative performance of retarded and nonretarded groups of similar mental age or level of conservation ability, the only significant difference that emerged was in the older groups of subjects. It was in these same groups of adolescent retarded and preadolescent nonretarded subjects matched for mental age of eight to nine years that significant difference in total TSI scores was derived between groups. Underlying this previously cited difference, a significant difference between groups was found in the comparative number of correct inferences made. The retarded subjects were significantly deficient in generating correct inferences, as overall they generated fewer inferences, had a higher percentage of misinferences (i.e., 23% as opposed to 15% for the non-retarded group), and were more prone to give a descriptive rendering
of what went on in the situation. It should be noted, however, that
taken individually, none of these measures were significantly dif­
ferent between the aforementioned groups.

ANALYSIS OF FINDINGS: INTENTIONAL ASCRIPTIONS

Before discussing the findings in this area, a short explanatory
note seems indicated in order to alleviate any confusion over the
labeling of essentially emotional ascriptions with the word "inten­
tional." The word "intentional" refers to the state of mind with
which an act is done. Thus, when an intentional ascription is made,
its content deals with the thoughts, desires, and/or feelings of a
particular actor. In this section, then, we are dealing with vari­
ous groups of performers' abilities in making intentional ascriptions,
i.e., ascribing an internal state of mind, based on facial expressions.
If the reader wishes, for the sake of clarity, we are examining the
subject's ability to ascertain the causal connection between a partic­
ular facial expression the pictured character is wearing and the
particular emotion that is underlying and giving rise to it.

With the above definition in mind, let us now proceed to a dis­
cussion of the findings.

The results garnered from this study stand in support of Iacobbo's
(1977) and Harris' (1977) findings that retarded subjects, when
matched for chronological age with nonretarded subjects, are less able
to make emotional ascriptions when cues consisting of facial expres­
sions are made available. It should be noted, however, that although
these findings were replicated in this study, an important difference
between it and those conducted by Iacobbo (1977) and Harris (1977) needs to be taken into account. The difference is that in this study situational cues, as well as cues based on facial expression, were included in the pictures presented. Yet, despite these auxil­
ilary environmental cues, the retarded subjects were still significa­
cantly less competent in making emotional ascriptions than non­
retarded peers of the same chronological age.

In the comparison of retarded and nonretarded groups of the same mental age or conservational level in their ability to make such ascriptions, we find no significant difference between groups of older subjects. In the younger age groups, however, a significant difference between groups did emerge. These findings lend credence to the assertion that matching for mental age gives no assurance that retarded groups will not be deficit in this area, when compared to nonretarded groups of the same mental age.

ANALYSIS OF FINDINGS: CAUSAL INFERENCE

Various groups of retarded and nonretarded subjects were also compared on their displayed ability to generate inferences of several differing types. It should be noted that the primary concern in this area was not whether there were differences between groups in ability to generate correct inferences, but whether differences in ability to generate certain forms of inferences would emerge.

The first inference type to be so examined consisted of those inferences that required a causal connection to be made between the depicted environmental event and the emotion a particular character
was exhibiting. These inferences took the form, "Actor X feels emotion Y due to event Z." Results derived revealed no significant differences between retarded and nonretarded groups when compared on the basis of either shared chronological or mental age. The only significant difference that did emerge occurred between nonretarded groups of different chronological ages, with a significantly higher incidence of such inferential responses in the older age group. This result is clearly in line with the finding cited earlier of a significant increase with age of total number of inferences made in the nonretarded groups.

The above findings were reproduced in part in the examination of those inferences, where a causal connection was drawn between the activity the pictured character was engaged in and the causal determinate that could either be an ongoing environmental event or an internal intentional state. Once again, results showed a significant increase with chronological age in the mean number of inferences made in the nonretarded subject population. Further, as was the case in the above examination of causal inferences of the form, "Actor X felt emotion Y due to event Z," no significant difference in the ability to generate causal inferences of the form, "Actor X did action Y due to event or internal state X" was found in comparing retarded groups of different chronological ages.

In comparing retarded with nonretarded groups of the same chronological age, significant differences did emerge between groups. The retarded groups were significantly poorer in generating causal inferences of this form, when compared to their same age nonretarded peers.
When compared to nonretarded groups of a similar mental age, however, no significant differences between retarded and nonretarded groups emerged.

In order to further explore the inference form, "Actor X did action Y due to event or internal state Z," an analysis was conducted to determine whether differences between groups would emerge when a distinction was drawn between those inferences of the above form, where either a specific event or an internal intentional state was substituted for Z.

The analysis of the ability to generate inferences, where a causal connection was made between an event and the activity the character engaged in, yielded no significant differences in mean scores between any of the groups examined.

Despite this lack of significant difference, however, there were decidedly marked differences between the older retarded and nonretarded groups in percentages of inferences of this form, where the environment was seen as causal in the actor's action, with 39% of the retarded subjects' inferences alluding to environmental circumstances as causal, while only 20% of the nonretarded subjects saw the environment as a causal factor. In both the retarded and nonretarded younger age groups, on the other hand, approximately 48% of their responses of this form in both groups had the environment as a causal factor.

In turning to an examination of inferences of the same form as above, i.e., "Actor X did action Y due to Z," where Z was given the value of an intentional internal state of the actor, we find that, as with the other measures of inferential ability cited earlier, the
groups of average intelligence displayed a significant difference in number of inferences generated, with increases in chronological age. When compared to retarded subjects of the same chronological age, a significant difference also emerged, as the retarded subjects had significantly greater difficulty in generating causal inferences of the form, "Actor X did action Y because of intentional state Z." Significant differences also emerged in the older age groups when retarded subjects were compared to nonretarded subjects of the same mental age. Once again, the retarded group emerged with a significant deficit in this ability, when compared to nonretarded subjects.

The above cited findings of significant increases with age in the ability to see intentions as causal in the actions of another person in nonretarded groups of subjects are clearly in line with those cited by Flavell (1968), Feffers (1970), Lively and Bromley (1973), Peever and Secord (1973), Byrne (1973), and Selman (1980), who all found a significant change in the ability to describe and understand dispositions, intentions, etc. as causal in the actions that other people engage in, occurring between the ages of five and seven or eight. The results obtained in this study point to the fact that in groups of children of normal intelligence, there is a significant shift during this period in frequency of attributions made that utilize intentional causality in explaining the behavior that other people display.

The retarded groups did not, however, show this decided shift with age. The environment continued to be cited in a far higher percentage of such inferences made, when compared to nonretarded subjects of a
similar age (i.e., 40% as opposed to 20%). This, coupled with the fact that the older retarded populations generated fewer overall inferences of the form, "X did Y due to Z," accounted for the significant differences between the older retarded and nonretarded groups of the same mental age.

**ANALYSIS OF FINDINGS: MATCHING FOR MA VERSUS CONSERVATION**

In looking over results obtained, it would appear that constructing groups based on ability or inability to conserve had no real significance in this study. As the reader will remember, groups six and eight of retarded subjects consisted respectively of non-conservers and conservers. On no measure did they significantly differ. Further, over half of group five were nonconservers, but on no measure did it significantly differ from group seven, which consisted entirely of conservers. One might say that this is not surprising, due to the similarities in chronological and mental ages shared between groups five and seven, and between six and eight (Table 2). This does become problematic, however, if one wants to assert that the ability or inability to conserve correlated with any of the other abilities measured in this study.

This becomes particularly problematic for a theorist such as Selman (1973, 1976), who has made the assertion that the ability to ascribe personal reasons or motivations as causal in an actor's behaviors is somehow tied to the emergence of conservational abilities. The data that this assertion is based upon was to an extent replicated in this study. A definite shift was found in the ability to make
inferences of this form over the expected ages, based on Selman's theory. It would also seem, however, that if the expected emergence of the ability to conserve had any correlation with the ability to see a causal connection between the actor's internal intentional state and the activity he or she engages in, there should also be a significant difference between the groups of the same chronological and mental age, which were composed of nonconservers versus conservers. Such differences were not found, and the question arises as to whether conservational ability has any effect on the ability to see internal intentional states as causal in other people's actions.

CONCLUSION

As originally stated, the purpose of this study was to examine similarities and differences between retarded and nonretarded populations, tapping a variety of social perceptive abilities, when groups of subjects were matched on the measures of chronological age, mental age, and/or ability or inability to conserve.

Results derived on between-group measures, where nonretarded groups and retarded groups were compared with like groups of a different chronological age, generally supported previous findings (Charette, 1972) that in nonretarded preadolescent populations there is a significant increase in number of both total and correct inferences generated with increasing age. Accompanying this is a significant decrease in both enumerative responses, which cease for the most part by
age seven, and in descriptive responses. A significant increase in total TSI scores with age also occurs, which supports both Edmonson et al.'s (1974) and Charette's (1972) findings.

Results obtained for the retarded sample over chronological age in the study are less clear-cut. Despite the fact that there were significant increases with age in correct inferences, ability to generate inferences of the form, "X felt Y due to Z," and in total derived TSI scores, there was not a significant difference between younger and older groups in other measures such as total number of inferences, number of descriptive responses, ability to make intentional ascriptions, etc. One possible explanation is that the retarded subjects displayed a definite viscosity of development (Inhelder, 1966). Retarded subjects may be slower in their inherent speed of development, and may experience a gradual deceleration of development, leading to the utilization of less developmentally advanced responses in dealing with the how's and why's of social situations.

This theorized viscosity inherent in the development of retarded subjects could well explain why no significant differences between retarded groups, which differed in age by up to six years, was obtained in many measures; while nonretarded groups, which differed by up to four years in chronological age, did show significant differences in group scores on most measures. Of course, another explanation may be that between the ages five to nine in all populations there is a more readily apparent increase in those social perceptual abilities tapped in this study, while between the ages of eight or nine and twelve to fourteen there is less of a developmental shift in such
abilities. A further study could, of course, test this second thesis by looking at either the development of skills in a retarded population between the ages of five to nine, or in a nonretarded population between the ages of eight to fourteen, and comparing the findings to those in this study. It is this author's opinion, however, that the former of the two explanations would more likely be supported by additional research into this area.

This notion of viscosity of development could also account for much of the differences between retarded and nonretarded subjects of the same chronological age, particularly since findings in this study indicate that retarded subjects are more prone to give developmentally primitive responses, i.e., enumeration and description, than their same-aged nonretarded peers. This is not to say that Edmonson, et al.'s (1971) theory is not useful in possible accounting for the higher percentage of incorrect inferences in those inferences the retarded performer does make, but it is not useful in accounting for this developmental lag found in relative frequencies of various response types exhibited.

Thus, the notion of a difference in rate of cognitive development in the retarded population found both in Inhelder (1966, 1968) and in Zigler (1969) would appear to have garnered favorable support in this study. Further, the trend in overall response patterns in retarded populations when compared to normal populations, is in the same direction as would be predicted by this model.

Zigler's (1969) model also predicts that individuals of differing IQ's, who share the same mental age, should behave exactly the same on
cognitive tasks. By matching groups of retarded and nonretarded subjects on the basis of mental age, this study examined the validity of this assertion for an array of social perceptual skills. In support of the developmentalist position, it was found that retarded and non-retarded subjects of the same mental age do not show significant differences in relative frequencies of inferential, descriptive, or enumerative responses. Yet it must be noted that significant differences were obtained between groups on total scores derived on the TSI, and on number of correct inferences made. These findings do not negate the developmentalist position, however, since deficits in the retarded performers' response content, compared to nonretarded performers of the same mental age, are not of concern, as long as the configuration of the form of responses between groups is not significantly different.

An interesting difference that also emerged between retarded and nonretarded groups of the same mental age was in the ability to make intentional ascriptions, and to see such internal intentional states as causal in an actor's behaviors. Retarded subjects in the younger age groups displayed significant deficits in the ability to make emotional ascriptions, when compared to nonretarded groups of the same mental age. Further, in the older age groups, retarded subjects were significantly less likely to hold that internal states of an actor were causally determinate in the behaviors that actor displayed. Older retarded subjects generated less inferences of form, "X did Y due to Z," and, of the inferences they did generate, were far more likely to see external forces at work in determining how the actor behaved.
These findings are supportive of Gardner and Barnard's (1969) contention that, as a group, mentally retarded subjects have weaker and less developed person perception abilities than do nonretarded groups of the same mental age.

The findings do not, in and of themselves, mitigate Zigler's thesis, however, for despite the fact that the content of inferences of the form, "X did Y due to Z," differed between groups of retarded and nonretarded subjects of the same mental age, and despite the deficit in the ability to make correct intentional ascriptions on the part of certain age groups of retarded subjects, no differences between groups emerged in the ability to generate inferences of any general form, when matched for mental age. These findings can be explained in a manner consistent with Zigler's position if one accepts the hypothesis that retarded subjects are more outer-directed than nonretarded peers (Zigler, 1969). If this hypothesis is accepted, retarded performers could be seen as deficient in utilizing the analogical reasoning necessitated in making intentional ascriptions based on others' behavioral displays, due to a relative lack of practice in using such ascriptions in explanation of their own behavior. Retarded performers could also be less likely to see internal intentional states as causal in a person's actions, due to this fixation on external cues in guiding their own behavior. As a result, the retarded performer could be seen as likely to hold external factors as causal, due to outer-directedness in determining his own behavior.
Therefore, factors other than cognitive deficits secondary to IQ differences between groups matched for mental age can be cited to account for differences in response tendencies found in the retarded population.

In the final analysis, Zigler's developmental position was not refuted in this study, and much of the evidence garnered was supportive of it. Some doubt, however, was cast on Selman's (1973, 1976) position that the ability to see intentional states as causal in the actor's behaviors is somehow dependent on the emergence of the ability to conserve. No support was found for this contention in this study. Indeed, if one accepts Popper's (1959) falsifiability criteria as cogent in the philosophy of science, one might say that the lack of significant difference on this measure between conserving and nonconserving groups, matched for mental and chronological age, refutes Selman's hypothesis as to why this definite shift in abilities occurs over the age span from circa five to circa eight.

To hold that Selman's position is refuted is not, however, completely viable. Certain philosophers (Hempel, 1966) have pointed out that the concept of a critical test leading to a falsification of a given theory is a questionable assumption. Test requirements and other experimental parameters serve as auxiliary hypotheses of the validity and applicability of experimental procedures in the testing of specific hypotheses. These can always be called into question if experimental results are not in line with theoretical expectations. On this basis, the results in this experiment that seem to contra-indicate Selman's attempt to make a connection between conservational
abilities and the ability to make causal intentional ascriptions can be called into question. In this study, Selman's instrument was not used, and definitional boundaries of certain terms he used (e.g., "intentional") may have been violated. Both of these problems are inherent in scientific undertakings, as words may take a different meaning in different theoretical frameworks, and instruments arising from different theoretical positions may be so dissimilar that they cannot be used to measure the same constructs (Kuhn, 1970). Thus, although this experimenter feels that some doubt has been cast on this particular facet of Selman's theoretical position, more research is needed, using Selman's techniques with two groups of nonretarded subjects matched for mental and chronological age, but differing in ability to conserve.

This study has supported Zigler's contention that performers matched in the basis of mental age will not differ in form in the types of cognitive abilities they display. This is not to say that content will not differ between retarded and nonretarded populations, but these differences in content are handled by allusions to differences in motivational and experiential factors that are not unique to the retarded population.

This empirical support of Zigler's theory does not, however, appear to support any particular epistemic rendering of the process whereby knowledge is obtained by the human organism. The reason for this is that the construct of mental age is epistemically neutral in a genetic sense, since it is a measure of the resultant contents of a
process (Milgram, 1968). It is a measure of the knowledge the subject possesses, and as such has no real bearing on the epistemic process that has given rise to it.

Zigler's developmentalist position holds that cognitive performance is solely a function of the subject's cognitive level, measured as mental age, irrespective of the amount of time involved in reaching that cognitive level. The process whereby the individual has reached a given cognitive level is not an issue. Instead, the developmentalist position is concerned with the display of identical formal cognitive processes by all subjects at a given level of cognitive development, resulting in similar performance on cognitive tasks across populations. Zigler, therefore, need not commit himself to an epistemic etiological postion concerning the genesis of cognitive processes. Rather, Zigler need only be concerned that, once derived, these processes will be similar across non-organically involved populations of a shared level of functioning.

In looking at the epistemic positions developed in Chapter One, it becomes obvious that the claim of similarity of cognitive functioning across various groups matched for mental age can be seen as consistent with any of these positions. For instance, an adherent of Position I could consider behavior or knowledge as innately inset, and cite a difference in maturational unfolding as accounting for the slower rate of development in retarded subjects. At the opposite end of the spectrum, an adherent of Position V, considering both form and content of behavior as derived passively from the external environment,
need only cite a difference in experiential opportunity, where deficits in the non-organically involved performer are held to be a function of environmental deprivation. Each of the intermediary positions could also generate predictions that groups matched for mental age would exhibit similar cognitive processes. Thus, in order to generate the notion that groups of performers matched for mental age will perform the same on cognitive tasks assigned them, a theorist in any of the epistemically differing camps need only hold that the retarded subject differs in degree, and not in kind, from his nonretarded counterpart. Zigler (1969) seems to realize this to an extent when he claims theoretical consistency with Piaget, Vygotsky, Werner, and Luria. He apparently fails to realize, however, that claims of similarity of cognitive functioning in groups matched on the basis of a content measure of derived knowledge can be made consistent with the epistemic proclivities of any theorist, including those who do not adhere to a notion of stages as being inherent in cognitive development. Therefore, support for Zigler's thesis has little bearing on the subject of the epistemic groundings of knowledge. Its value lies in the generation of research examining the possibility of underlying defects of cognitive make-up so as to exclude a possible difference in kind between non-organically involved retarded performers and nonretarded peers matched for a level of cognitive functioning.
Appendix A
Dear Parent or Guardian:

This is a letter to inform you that your child is being given the opportunity to be a part of a study involving an examination of the development of social inference skills between different populations of handicapped versus non-handicapped children. This study is being conducted by Reese Price and Doctor George Vranekovic of Parsons State Hospital and Training Center. The children who receive their parent's permission will remain completely anonymous and will be identified only by a numerical coding system.

Each participant's involvement will consist of completing either a Peabody Picture Vocabulary Test (which consists of pointing to a picture that depicts a presented stimulus word), or a series of Piagetian conservation tasks (which consists of judging whether amounts of various substances [clay, water, etc.] vary or remain the same depending upon the way they are presented), and the Test of Social Inference (which consists of looking at, telling a story from, and answering questions about pictures that portray various social situations). The entire procedure will involve approximately 30 minutes of testing time at the child's school. There are no personal risks involved in participating in this study.

We hope you will decide that you want your child to participate in this study, as it will help us to understand how to better serve a wide variety of children in the development of their social skills. Any questions concerning this study can be directed to Reese Price or Dr. George Vranekovic at 316-421-6550, ext. 346 or 349.

Involvement in this study is completely voluntary and you may withdraw your permission at any time. If you want your child to participate, please check Box #1 below and return this letter with your child to his classroom teacher. If your child is allowed to participate and you are interested in being informed of the outcome of this study, please check Box #3 to receive this information.

Sincerely,

Reese E. Price, M.A.

I want my child to participate [ ]
I do not want my child to participate [ ]
I would like to know the outcome of this study [ ]

Signed ____________________________
Dear Parent or Guardian:

This is a follow-up to a letter that was sent to you about our research project several weeks ago. We did not receive a reply and we did not know whether this was because you did not want your child to participate or because you wanted him/her to participate, but failed to get the letter back to us. The project your child will be involved in is a worthwhile one that will add much to our knowledge of how different populations of children develop and thus allow us to better understand how to help children develop to their maximum potential. The testing will be done at your child's school and will be no more than 30 minutes in length.

We hope you will want your child to participate in this study, but we will not bother you further in this regard. We ask that you please return this letter with your child when he or she returns to school tomorrow along with your answer. If you do decide to let your child participate and you would like a report on our results, please check the third box displayed below.

With thanks,

Reese Price, M.A.
Psychology Intern
Parsons State Hospital and Training Center

I do want my child to participate □
I do not want my child to participate □
I would like a report of the results of this study that my child has participated in □

Signed ___________________________
Appendix B
Supplementary Questions

Card K-30
1. How does she feel?
2. Why does she feel that way?

Card K-30#7
1. How does he feel?
2. Why does he feel that way?
3. Why is he frowning?

Card K-20#8
1. How does she feel?
2. Why does she feel that way?
3. Why is she crying?

Card K-30#13
1. How do they feel?
2. Why do they feel that way?
3. Why is the boy holding onto his mother?

Card K-30#19
1. How does the woman feel?
2. Why does she feel that way?
3. How does the boy feel?
4. Why does he feel that way?
5. Why is the woman sending the boy away?

Card K-30#21
1. How do they feel?
2. Why do they feel that way?

Card K-30#24
1. How do these people feel?
2. Why do they feel that way?
3. Why are these two people (indicate Japanese runner and old man with trophy) laughing?
1. How do they feel?
2. Why do they feel that way?
3. Why is the boy laughing and running?
Appendix C
Correct Responses for Supplementary Questions

Card K-30

Q1. Surprised, shocked, angry
Q2. Because of interpreted event.

Card K-30#7

Q1. Angry, mad, tired, sad, unhappy
Q2. Because of interpreted event.
Q3. Emotion (anger) or because of interpreted event.

Card K-30#8

Q1. Sad
Q2. Because of interpreted event.
Q3. Emotion (sad) or because of interpreted event.

Card K-30#13

Q1. Sad, unhappy, scared
Q2. Because of interpreted event.
Q3. Emotion (scared) or because of interpreted event.

Card K-30#18

Q1. Sad, unhappy
Q2. Because of interpreted event.

Card K-30#19

Q1. Mad, scared
Q2. Because of interpreted event.
Q3. Happy
Q4. Because of interpreted event.
Q5. Emotion (mad, scared) or because of interpreted event.
Card K-30#21  Q1. Happy
               Q2. Because of interpreted event.

Card K-30#24  Q1. Happy
               Q2. Because of interpreted event.
               Q3. Emotion (happy) or because of interpreted event.

Card K-30#27  Q1. Happy
               Q2. Because of interpreted event.
               Q3. Emotion (happy) or because of interpreted event.

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