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AN INVESTIGATION OF PREDICTED DIFFERENCES IN THE ACQUISITION OF FORMAL OPERATIONAL THOUGHT BETWEEN NORMAL AND INSTITUTIONALIZED EMOTIONALLY DISTURBED ADOLESCENTS

APPROVED BY

CHAIRMAN Robert E Rayland

DISSERTATION COMMITTEE

To Eleanor, my wife

with total love, respect and appreciation that cannot be adequately expressed in words. Without you it simply would not have been worth it. You are my love, my companion and my friend, not only on the mountaintop but also in the valley as well.

MAY IT BE SO FOREVERMORE

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What was once an impossible dream is now unbelievable reality. There are so many people who have influenced my life both personally and educationally that it would be impossible to give adequate consideration to all. However, a few significant individuals need be mentioned at this time.

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PRAISE GOD FROM WHOM ALL BLESSINGS FLOW

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CHAPTER I

INTRODUCTION

Since the early 1950's the works of Jean Piaget have been widely acclaimed by educators, child psychologists and numerous other professionals in diverse fields, thus establishing him as "the foremost contributor to the field of intellectual development".[1] At the present time, Piaget appears to be the most often quoted authority in the field of child psychology. His theories have served as a catalyst for voluminous publications as well as topics of discussion "in many different areas -- psychological, educational, philosophical, psychiatric."[2]

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[1]Herbert Ginsburg and Sylvia Opper, Piaget's Theory of Intellectual Development - An Introduction, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969), p.ix.

[2]Ibid., p. ix.

Piaget showed an early interest in the biological sciences. When he was only eleven years old, he published his first article.[3] From his early works in biology, Piaget gradually turned to the psychological development of the child. His intention was to find a correlation between the biological study of life and the philosophical study of knowledge.[4]

Consequently, the contribution of biology to Piaget's basic theory of intellectual development is substantial. He continually shows how various biological concepts have their parallels in the explanation of intellectual development. In Piaget's view, cognitive development must have its roots firmly planted in biological growth.[5]

Since 1920, Piaget and his associates have been responsible for more meaningful research and theory development than any other investigators in the field of child psychology.[6] This increasing amount of interest among modern psychologists and educators in Piagetian theory can be attributed to three factors. First, he has introduced new and interesting ideas that heretofore had been overlooked. Second, Piaget's theories

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[3]Ibid., p. 1.

[4]Ibid., p. 12 - 13.

[5]John Flavell, The Developmental Psychology of Jean Piaget, (New York: Van Norstrand, 1963), p. 82 - 83.

[6]Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 3 - 7.

have done much to establish current attitudes regarding child development in that his propositions are creative and offer a challenge or perhaps a viable alternative to the trend of behaviorism presently dominant in American child psychology. Finally, Piaget has formulated his theory of child development based upon an extensive evaluation of children at all age levels. His efforts represent nearly fifty years of research and are strongly supported by empirical data.[7]

Although Piagetian theory has been successful in generating major quantities of research, there are certain areas that, until recent years, have been relatively void of Piagetian-oriented studies. One such area is that of the cognitive functioning of the emotionally disturbed child. Recognizing the potential of certain aspects of Piaget's theory when applied to this setting as well as research and psychotherapeutic implications, Jepsen[8] compared the performance of normal and institutionalized emotionally disturbed children on specific conservation tasks in an effort to focus on expected differences in their ability to conserve as a result of the collateral development of their cognitive and affective structures.

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[7] Ibid., p. 12 - 13.

[8] M. L. Jepsen, "Comparison of Conservation Performance of Normal and Institutionalized Emotionally Disturbed Children," Unpublished Doctorial Dissertation, University of Oklahoma, 1975.

This study is a continuation of Jepsen's work investigating the relationship between affective and cognitive thought processes as measured by the performance of mid-age adolescents on a battery of concrete operational and formal tasks designed to measure intellectual development. According to early Piagetian theory, by the mid-adolescent years a child has reached equilibrium in the formal operational phase of cognitive development. In 1972, however, Piaget amended his position stating that the process of equilibrium is not completed during mid-adolescence, but rather extends into adulthood.[9]

This equilibrium allows the formal operational thinker to combine propositions and to isolate variables in order to formulate his hypotheses. He no longer needs to think in terms of objects or concrete events, but instead can perform symbolic operations in his mind.[10]

Psychologically, adolescence by its very nature is a tenuous period necessitating new adjustments, specifically those that distinguish child behavior from adult behavior (in a given society). Therefore, by the very nature of this

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[9]Jean Piaget, "Intellectual Evolution from Adolescence to Adulthood," Journal of Human Development, 15: 1 - 12, (1972), No. 1.

[10]Jean Piaget, "Cognitive Development in Children," Journal of Research in Science, Vol. 2, Issue 3, (New York: John Wiley and Sons, 1964).

transitional period, the majority of adolescents in the general population encounter many conflicts potentially capable of impeding emotional development and oftentimes directly contributing to some degree to emotional disturbances characteristic of the adolescence period. Based on Jepsen's study, it would be assumed that these conflict areas associated with emotional difficulties based on degree of severity could affect the cognitive functioning of the adolescent as well.

STATEMENT OF PROBLEM

The purpose of this study is to determine whether the formal operational development of institutionalized emotionally disturbed adolescents will be significantly impaired when compared to normal adolescents of the same chronological age showing no history of emotional problems. This investigation extends Jepsen's research to a higher chronological age level in an attempt to support his findings indicating that a disturbance in the affective realm can be correlated to a disturbance in the cognitive realm of intellectual development.

As in Jepsen's study, consideration will be given to the patterns of intellectual performance among emotionally disturbed adolescents and normal adolescents as well as sex differences among and between the two groups. Likewise, this investigation is based on the Piagetian model of cognitive development; therefore, his assumptions will be accepted.

DEFINITION OF TERMS

Accommodation - Accommodation is the manipulation of internal structures in order to correspond with reality.[11]

Action - Action is the behavior which constitutes the substance of all intellectual and perceptual adaptations. It is initially overt but becomes more internalized with development.[12]

Adaptation - Adaptation is an invariant function characteristic of intellectual development closely associated with aspects of biology.[13]

Assimilation - Assimilation is the manipulation of reality to correspond with the existing structures of the organism.[14]

Centering - Centering is the tendency to attend to a single striking characteristic of an object to the neglect of other characteristics resulting in a distortion of reality.[15]

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[11] Jean Piaget and Barbel Inhelder, The Psychology of the Child, (New York: Basic Books, Inc., 1969), p. 6.

[12] John Flavell, The Developmental Psychology of Jean Piaget, (New York: Van Norstrand, 1963), pp. 82 - 83.

[13] Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 18.

[14] Op. cit., Piaget and Inhelder, The Psychology of the Child, p. 2.

[15] Op. cit., Flavell, The Developmental Psychology of Jean Piaget, p. 157.

Conservation - Conservation is the ability to understand that certain qualities of an object remain constant while other qualities of the object are changed.[16]

Egocentrism - Egocentrism refers to the child's distorted view of reality in that experiences are assimilated only as they relate to him.[17] It represents an inability to interpret experiences from another's point of view.[18]

Equilibration - Equilibration is the major characteristic principle of mental development since all mental development progresses toward more complex and stable levels of organization.[19]

Juxtaposition - Juxtaposition is thinking which arises through concentration upon the parts or details of an experience without relating those parts into a whole.[20]

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[16]Jean Piaget, "Development and Learning," The Journal of Research in Science Teaching, 1964, No. 3, p. 177.

[17]Ruth Beard, An Outline of Piaget's Developmental Psychology for Students and Teachers, (New York: Basic Books, Inc., 1969), p. 9.

[18]Jean Piaget, Six Psychological Studies, (New York: Random House, Inc., 1967), p. 16.

[19]Ibid., p. xxii.

[20]Peter G. Richmond, An Introduction to Piaget, (London: Routledge and Kegan Paul, Ltd., 1970), p. 25.

Reversibility - Reversibility is the permanent possibility of returning to the starting point of the operation in the thought process.[21]

Schema - Schema are structures of thought at the various levels of mental development.[22]

States in a Transformation - States in a transformation are transformations of the object of thought by which one state or property is altered or changed into another and each state is integrated into the total transformation.[23]

Structure - Structure is a mental system or totality whose principles of activity are different from those of the parts from which it is composed.[24]

Transductive Reasoning - Transductive reasoning lies between inductive and deductive reasoning in that it goes from particular to particular without focusing on the general.[25]

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[21] Op. cit., Inhelder and Piaget, The Growth of Logical Thinking from Childhood to Adolescence, p. 272.

[22] Op. cit., Piaget, Six Psychological Studies, p. xxii.

[23] Op. cit., Jepsen, "Comparison of Conservation Performance of Normal and Institutionalized Emotionally Disturbed Children," p. 84.

[24] Op. cit., Piaget, Six Psychological Studies, p. xxii.

[25] Op. cit., Ginsburg and Oppe., Piaget's Theory of Intellectual Development - An Introduction, p. 84.

CHAPTER II

INTRODUCTION TO PIAGET'S THEORY

Piaget has constructed a theory of mental development systematically comprised of distinct stages, each of which contributes sequentially to the cognitive development of the child from birth through adolescence.[26] Each stage is characterized by the appearance of original structures distinguishing it from previous stages along the developmental continuum while incorporating characteristics from preceding stages in order to create a more refined cognitive process. Each of the stages represents a particular form of equilibrium as a function of its characteristic structures, and mental development moves toward equilibrium. Thus, mental development is seen as a continuous construction process that becomes more solid with each additional stage.[27]

The first stage, the sensori-motor stage of cognitive development, is described thoroughly by Piaget. This stage extends from birth to about two years of age and is subdivided

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[26] Op. cit., Peter G. Richmond, An Introduction to Piaget, p. 7.

[27] Op. cit., Jean Piaget, Six Psychological Studies, p.5-6.

into six developmental sub-stages.[28] Basically, this period of development is characterized by a process of decentration in which the child is initially in an undifferentiated state unable to separate self from environment or wish from reality, but eventually makes the transition to a greater separation of self and environment. This process leads to a greater understanding of the external world and at the same time an increased comprehension of the self.[29]

The following developmental sub-stages constitute the sensori-motor stage:

1. Reflexes (0 - 1 month) consists primarily of the use of inborn reflexes (i.e., sucking schema);

2. Primary Circular Reactions (1 - 4 months) the reflexes are replaced by voluntary movements;

3. Secondary Circular Reactions (4 - 8 months) marks the beginning of intentionality and even an incipient form of goal-directed behavior;

4. Coordination of Secondary Schemata (8 - 12 months) is characterized by the emergence of means-ends behavior (i.e., the concept of "object permanence" emerges);

5. Tertiary Circular Reactions (12 - 18 months) the concept of object permanence becomes more stable;

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[28] Rolf E. Muus, Theories of Adolescence, Second Edition, (New York: Random House, 1969), p. 154.

[29] Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 68.

6. Internalization of Sensori-Motor Schemata (18 - 24 months) the concept of foresight and symbolic representation are employed in solving sensori-motor related problems.[30]

The initial emphasis of the sensori-motor stage is concentrated on the child's lack of awareness of self and environment. In essence, at birth the world is spaceless, timeless and objectless, an undifferentiated experience of the present.[31] However, the infant is not totally helpless. He possesses certain abilities which are insured by heredity. In describing the newborn's behavior, Piaget emphasizes, first, that the sucking reflex, and others too, are not simply activated by external stimuli, but are often initiated by the newborn himself. Second, although the physical structure of the infant provides ready-made mechanisms, these furnish only a foundation for future development.[32]

In short, the infant's world will become something to be looked at, listened to, and as soon as his own movements allow, to be manipulated.[33] His internal needs are satisfied by the exercise of his reflex behavior patterns upon the

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[30]Op. cit. Muuss, Theories of Adolescence, Second Edition, p. 154 - 155.

[31]Op. cit., Richmond, An Introduction to Piaget, p. 8

[32]Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 29.

[33]Op. cit., Piaget, Six Psychological Studies, p. 10

environment in which he is placed. The specific conditions in the environment result in a modification of these patterns. The child makes simple discriminations and coordinates his separate behaviors in a rudimentary way resulting in the acquisition or adaptations of new behavior patterns.[34]

The coordination process of sensori-motor actions continues with newly acquired behavior patterns being applied to the environment in a more generalized fashion than was seen when such adaptations were first made. Thus, the intellectual progress made during these first two years is massive. Objects have permanence, have an existence of their own, rather than being just an extension of self. Events presume a cause and effect relationship. However, this progress is strictly limited in the sense that the child's understanding of his environment does not surpass those properties of objects and events which arise directly from his actions relating to them. He has attained practical knowledge which is unique to him.[35]

According to Piaget, the second stage of cognitive development is the preoperational stage which begins at about the second year and begins to leave at about seven years of age. During

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[34]Op. cit., Richmond, An Introduction to Piaget, p. 9.

[35]Ibid., p. 13.

this period, the child is transformed from an organism whose most intelligent functions are sensori-motor, overt acts to one whose upper-limit cognitions are inner, symbolic manipulations of reality.[36]

Notable developments in this period are the onset of language, symbolic functions and representational thought. The appearance of language profoundly modifies behavior both affectively and intellectually.[37] Symbolic functions allow the child to employ mental symbols, to engage in symbolic play, and to use words. This ability to symbolize makes it possible for the child to operate on new levels in that he is not restricted to the immediate environment but can evoke mental images from the past.[38] Representational thought has the potential to simultaneously grasp a multitude of separate events. It enables the child to recall the past, represent the present, and anticipate the future in one temporally brief, organized act.[39]

The following are certain principal concepts representative of this period of cognitive development. They are egocentrism,

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[36]Op. cit., Flavell, The Developmental Psychology of Jean Piaget, p. 151.

[37]Op. cit., Piaget, Six Psychological Studies, p. 17

[38]Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development, p. 73.

[39]Op. cit., Richmond, An Introduction to Piaget, p. 14 - 16.

the concept of centering, the concept of states in a transformation, equilibrium, action, irreversibility, and the concept of transductive reasoning.[40]

Piaget says that "egocentrism is on one hand primacy of self-satisfaction over object recognition, and on the other hand, distortion of reality to satisfy the activity and point of view of the individual. In both cases, it is unconscious, being essentially the result of failure to distinguish between the subjective and the objective."[41]

The preoperational child is egocentric with respect to representations much like the neonate of the sensori-motor period. Piaget once characterized the preoperational child's thought as midway between the thought processes of a socialized adult and the completely autistic and egocentric thought described by Freud.[42] Preoperational egocentrism is characterized by (1) the inability to assume the role of the other person, and (2) lack of compunction to justify reasoning to others or look for possible contradictions in logic.[43]

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[40]Op. cit., Flavell, The Developmental Psychology of Jean Piaget, p. 156 - 160.

[41]Jean Piaget, Play, Dreams, and Imitation in Childhood, (New York: W. W. Norton and Company, Inc., 1962), p. 285.

[42]Op. cit., Piaget, Six Psychological Studies, p. 16.

[43]Op. cit., Flavell, The Developmental Psychology of Piaget, p. 156.

Also, characteristic of preoperational thought is the tendency to "center" or attend to a single striking feature of an object of its reasoning to the neglect of other important aspects, thereby distorting the reasoning.[44] However, this process represents the culmination and refinement of traits originating during the sensori-motor phase of development. The preoperational child, although unable to "decenter" or account for features which could balance and compensate for the distorted effects of a single centration, manifests an increasingly higher level of cognitive development.

Preoperational thought characterizes the child as one more inclined to focus attention upon the successive states or configurations of a display than upon the transformations of states. As a result, preoperational thought is static and immobile focusing on a specific momentary static condition while not adequately linking a whole set of successive conditions into an integrated pattern derived from the transformations which unify and render them logically coherent.[45]

Cognitive organization known as the assimilatory network tends to break and dislocate itself in the process of accommodating to new situations. As a result. in preoperational

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[44] Ibid., p. 157.

[45] Ibid., p. 157 - 158.

thought there is a relative absence of stable equilibrium between assimilation and accommodation. The preoperational child is not functioning so as to accommodate to the new by assimilating it to the old in a coherent rational way in order to preserve the fundamental aspects of the previous assimilatory organization. His cognitive processes, like his affective processes, have been described as unstable, internally inconsistent, moment to moment, and discontinuous.[46]

Preoperational thought tends to be action oriented in that the child's representations of reality are very close to overt actions in both form and operation. Piaget sees the cognitive process of the preoperational child much like a mental experiment that is an isomorphic, step by step mental replica of concrete actions and events. Thus, the child simply runs off reality sequences in his head just as he might do in overt actions. For this reason, preoperational thought is seen as extremely rigid.[47]

Piaget's concept of irreversibility is another important characteristic of preoperational thought. Cognitive organization is reversible when it follows a cognitive route, is able to reverse that thought pattern, to find again an unchanged

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[46]Ibid., p. 158.

[47]Ibid., p. 158.

point of departure. Likewise, it is capable of integrating into an organized whole various compensating changes resulting from a transformation, and, by seeing how each change is annulled by its inverse, maintaining the consistency within the system. In general, reversible thought forms are flexible and mobile, in a state of equilibrium, and able to correct distortions by implementing successive, quick-moving decenterings.[48]

Piaget's term "preconcepts" is used to describe the first primitive concepts employed by a young child. Accordingly, the preoperational child links certain preconcepts producing transductive reasoning. It is not categorized as either true inductive or true deductive reasoning, but rather proceeds from particular to particular. Transductive reasoning is characterized by associative "and connections" as opposed to true implicative and causal relations between the successive terms in a reasoning chain. In other words, according to Piaget, the child tends to "juxtapose" elements rather than connect them through logical or physical causality.[49]

In general, the preoperational child's cognitive processes are irreversible and attend to limited amounts of information, which are particularly the static states of

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[48]Ibid., p. 159.

[49]Ibid., p. 160.

reality.[50] The acquisition of language and the experience of social interaction are influential factors in decentralizing the child's view of the world. Thus, the limitations in the cognitive development characteristic of the preoperational period are diminished, resulting in a mental network that is more flexible, mobile, and coordinated.[51]

According to Piaget, the third stage of cognitive development is the concrete operational stage which begins around seven or eight years of age and generally extends to about fourteen or fifteen years. However, there is research to extend this period beyond fifteen years to as late as eighteen years of age.[52] This stage reflects the child's ability to deal with concrete objects. Many of the characteristics of preoperational thought are replaced and improved to provide more continuity to cognitive development.[53] The concept of operations is introduced during this period as actions which the child performs mentally have the added property of being reversible.

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[50]Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 168.

[51]Op. cit., Richmond, An Introduction to Piaget, p. 36 - 37.

[52]J. W. McKinnon and J. W. Renner, "Are Colleges Interested in Intellectual Development?" American Journal of Physics, September, 1971, pp. 1047 - 1052.

[53]Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 127.

Operations may also be described in terms of overall structures or systems. These operations performed by the child are concrete because they are only applied to objects which are immediately present.[54]

The concept of conservation is further increased and developed in a sequential pattern during this stage. Conservation is viewed as an operational process of the mind which produces the realization that certain aspects of a changing condition are invariant, despite changes in the entire system. Piaget states that conservation and reversibility are closely related. The acquisition of various conservations begins around six to seven years with some conservations developing from preceding ones.[55]

The process of reversibility, vitally important to understanding the concept of operations, is represented in two forms. First, inversion occurs when there is a combining of operations followed by their separation (i.e., when a cup full of beads is emptied after it has been filled). The second form of reversibility, called reciprocity, is represented by the translation of operations into equivalent forms producing a state of equilibrium (i.e., the eyes move to compensate for

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[54]Ibid., p. 150.

[55]Op. cit., Richmond, An Introduction to Jean Piaget, p. 42 - 43.

the changes in position of the head and so keep an object in vision).[56] This attained reversibility is a manifestation of a permanent equilibrium between the assimilation of objects to the mind and the accommodation of the mind to objects.[57]

The concrete operational stage of cognitive development is an internalization process whereby the overt, physical actions prevalent in the preceding stage are incorporated into mental actions or operations. The child of this period approaches tasks in a systematic fashion utilizing prior knowledge as opposed to a random, unorganized thought.[58] For example, he is prepared to focus on several aspects of a situation simultaneously, is sensitive to transformations, and can reverse the direction of his thinking.

The final stage, formal operations, theoretically begins around eleven years of age and is consolidated in subsequent years. Formal thought is "hypothetico-deductive" in the sense that it permits one to formulate hypotheses and not simply infer from actual observations. Logical operations begin to be transposed from the level of concrete manipula-

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[56]Ibid., p. 45.

[57]Op. cit., Piaget, Six Psychological Studies, p. 54.

[58]Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 168.

tion to the ideational levels where they are expressed in some kind of language without the validity of perception or experience.[59] Formal operations enables one to reason about contrary-to-fact propositions.[60]

Whereas the thought processes of the concrete operational child are tied to the concrete, the formal thinker can transcend the immediate here and now. He not only maintains certain characteristics of concrete thought, but is now prepared to expand his cognitions in order to compensate mentally for transformations in reality. On the other hand, the concrete thinker is also able to perform the foregoing mental activity. The formal thinker, however, has no need for concrete reality in order to exhibit the foregoing characteristics; the concrete thinker needs reality.[61] The thought processes are now liberated in the sense they are free to engage in spontaneous reflection and theorizing, essentials for creative thought. This distinguishes adolescence from childhood.[62] It is noted that numerous social and psychological factors will intercede

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[59]Op. cit., Piaget, Six Psychological Studies, p. 62 - 63.

[60]David Elkind, Children and Adolescents - Interpretive Essays on Jean Piaget, (New York: Oxford University Press, 1970), p. 20.

[61]Op. cit., Ginsburg and Opper, Piaget's Theory of Intellectual Development - An Introduction, p. 181.

[62]Op. cit., Piaget, Six Psychological Studies, p. 63 - 64.

to contribute to or detract from the cognitive development of the child as will significant experiences encountered during this period.

In summary, Piaget's theory of mental development is a process that unifies the progressive stages from the construction of the immediate environment by infantile sensorimotor intelligence to the hypothetico-deductive thought attained by many during adolescence. Cognitive processes develop as a result of successive constructions of information always involving a decentering of initial egocentric thought to allow for the coordination of relations and concepts essential to an increased adaptation to reality. Piaget not only focuses on intellectual development but emphasized affective development as well. Affectivity is seen as gradually disengaging itself from the self in order to submit to the laws of cooperation. Affective development, though important to intellectual development, is meaningless without intelligence which furnishes its means and clarifies its ends. In essence, the ultimate goal of all human activity is progression toward a more refined state of equilibrium.[63]

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[63]Ibid., p. 69 - 70.

CHAPTER III

REVIEW OF LITERATURE

A review of current literature supports Jepsen's contention that studies concerned with the affective and cognitive structures and their concomitant relationship as measured by conservation performance are limited. This is especially true when one investigates the affective-cognitive relationship as it relates to the emotionally disturbed child.

In his study, Jepsen[64] focused on this relationship in an effort to find if a disturbance in the affective realm implies a disturbance in the cognitive realm of development. He used as his measure the performance of twenty institutionalized emotionally disturbed children and twenty normal children on six Piagetian conservation tasks revised by Renner.[65] Each group consisted of an equal

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[64]Michael Jepsen, "Comparison of Conservation Performance of Normal and Institutionalized Emotionally Disturbed Children," Unpublished Doctoral Dissertation, University of Oklahoma, 1975.

[65]John W. Renner et al., "Piaget is Practical," Science and Children, (October, 1971), p. 23.

number of boys and girls ranging in age from eleven years six months to twelve years eleven months. He found a significant difference in the level of conservation performance between the two groups with the normal group superior. It was therefore assumed that emotionally disturbed children were functioning at a lower cognitive level than normal children of equivalent chronological age.

Lerner, Bie, and Lehrer[66] investigated cognitive processes of the institutionalized adolescent using Piaget's conservation tasks of solid amount, liquid amount, weight, and volume displacement as a measure of performance. They found that 50% of the 35 patients, ranging in age from 15 - 23 years (mean 18-8) gave preoperational responses on the volume displacement task while giving concrete responses for solid amount, liquid amount, and weight. A five-point scoring system was used to rate the quality of the subjects' responses. Subjects were classified as thinking on a concrete-operational level when they scored an average of four points for all tasks. Lower scores were considered preoperational.

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[66]Sandra Lerner, Ildri Bie, and Paul Lehrer, "Concrete Operational Thinking in Mentally Ill Adolescents," Merrill-Palmer Quarterly, Vol. 18, No. 3. (July, 1972), p. 287-291.

Brekke and Williams[67] question some of the findings of previous investigations that have disclosed differences between emotionally disturbed and normal children in their attainment of conservation and related concepts. Their study showed that normal subjects (10 years, 5 months to 14 years, 11 months) were able to conserve more often than hospitalized emotionally disturbed subjects (10 years, 7 months to 19 years, 5 months). The normal subjects had higher intelligence scores and were younger. However, when an analysis was made to determine the independent contribution of age, intelligence, sex, and emotionally disturbed-normal variables, only 3% of the variance was attributed to emotional disturbance. Therefore, they concluded that emotional disturbance as manifest in a hospital population does not contribute to a cognitive deficit in Piagetian conservation. Their results partially confirm results of Filer's[68] study in which she reported no significant difference in performance between emotionally disturbed and normal children on certain concrete operational tasks.

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[67]Beverly Brekke, John D. Williams, "Conservation of Weight With the Emotionally Disturbed", The Journal of Educational Research, Vol. 69, (November, 1975), p. 117 - 119.

[68]A. A. Filer, "Piagetian Cognitive Development in Normal and Emotionally Disturbed Children," Dissertation Abstracts International, 33 (5B0: 2342), 1972.

With few exceptions, there is noticeable absence of studies investigating the affective-cognitive relationship as it relates to cognitive development during adolescence. Rarely are formal operational tasks employed to investigate this relationship. More often, formal tasks are structured to measure cognitive development during adolescence to the exclusion of the affective components.

Graybill,[69] in an attempt to clarify contradictory results relating to the influence of sex differences in the transition from concrete to formal thinking, matched pairs of 9, 11, 13 and 15 year old boys and girls according to I.Q., school achievement, socioeconomic background, and as close as possible, for birthdates. Each of the subjects was interviewed on the four tasks selected: The operations of reciprocal implication, elimination of contradictions, separation of variables, and combinations of colored and colorless chemical bodies. She found that girls differed from boys at the point at which they developed the concept of logical thinking as defined by Piaget and Inhelder. Boys and girls began to show differences in logical thinking abilities at about eleven years of age. Boys begin to master

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[69]Letitia A. Graybill, "A Study of Sex Differences in the Transition from Concrete to Formal Thinking Patterns," Dissertation Abstracts, International, 34 (07-A): 3988, 1973.

formal levels at age 13 while girls develop significantly more slowly.

In a related study, Keating and Shaeffer[70] investigated not only sex difference as it relates to the development of formal thought, but added the variable of individual ability at well. Prior to this study, Keating (1975) had shown that psychometrically bright early adolescent boys evidenced formal operational reasoning ability much earlier than their peers of average ability. (Bright was defined as a score at the 98th percentile or above on the Iowa Test of Basic Skills). As a result, their study examined the acquisition of formal operations in bright and average girls and compared the results with that of the boys in the previous study. They found the bright students to show earlier acquisition of formal operational reasoning. Ability is the important factor in that the younger bright students evidenced more formal reasoning than the older average students both for the boys and the girls. Also, they reported results to support earlier findings suggesting that the sex difference in high level reasoning is greater at higher levels of ability.

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[70]Daniel P. Keating and Rosalind A. Schaefer, "Ability and Sex Differences in the Acquisition of Formal Operations," Developmental Psychology, Vol. 11, No. 4, (1975), p. 531-532.

Weeks[71] sought to discover patterns related to the development of formal operations abilities among junior high school students and related those findings to differences in grade, sex, socioeconomic status, scholastic aptitude, and school achievement. Her subjects were 190 seventh graders, 195 eighth graders, and 175 ninth graders equally divided basically by sex. Three tests were used to measure the development of formal operations. Most important, she found a significant sex difference at the eighth and ninth grade levels on conservation of volume with more boys than girls being successful.

Saarni[72] investigated how adolescents approach a particular problem-solving situation as a function of their cognitive developmental level. Sixty-four middle-class young adolescents ranging in age from 10 years 9 months to 15 years 1 month (mean 13-1) and divided evenly by sex, were administered two formal operational tasks and the rod and frame test (a measure of field dependence-independence). The results

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[71] Ruth T. Weeks, "The Relationship of Grade, Sex, Socioeconomic Status, Scholastic Aptitude, and School Achievement to Formal Operations Attainment in a Group of Junior High School Students," Dissertation Abstracts International, 34 (5-A): 2405, 1975.

[72] Carolyn I. Saarni, "Piagetian Operations and Field Independence as Factors in Children's Problem Solving Performance," Child Development, Vol 44, (1973), p. 338-345.

indicated that the Piagetian developmental levels significantly predicted student's ability to solve this problem. In contrast to the findings of previous studies cited, no significant differences were apparent in their performance on the formal tasks.

Greaney[73] investigated the relationship between the home environment and performance at the formal operational stage. She used two separate classifications for home environment. First, the social class of the students was determined according to the Hollingshead Index. Second, the home environment was evaluated based on an interview with the mother of the student. Her subjects were sixty 15-year-old junior high school students representing four social class groups: (1) Upper and upper middle class students; (2) Middle class students; (3) Upper lower class students; and (4) Lower class students. The Butch and Slim Game of propositional logic was used as a measure of formal operations. This instrument was validated against the Piagetian flexibility of rods experiment. A relatively low correlation (.33) was found between these measures. For the purposes of this study, the student's ability to manipulate the propositions specified in the Butch and Slim Game defined

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[73]Betty J. Greaney, "An Investigation of the Relationship between Formal Operational Ability and Home Environment," Dissertation Abstracts International, 35 (02-A): 887, 1974.

formal operations. She concluded that formal operations do not appear to be dependent upon home environment, but instead on other factors such as school experience, motivation, or peer interaction.

A related study by Nordland, Lawson and Kahle[74] focuses on cultural deprivation as a determining factor in the rate at which children and adolescents move from concrete to formal levels of thought. Attainment of formal operations has been related significantly to cultural factors. Their subjects were selected from two separate populations. One group consisted of 96 students with a mean age of 12-6 from a predominantly Black and Spanish-American urban junior high school. The second group was represented by 506 students with a mean age of 15-8 from a predominantly Black urban junior high school. Eight conservation tasks were administered along with two tasks designed to measure formal reasoning. Results indicated a lag in the acquisition of conservation concepts in disadvantaged primary school children which probably becomes greater in the adolescent years. Also, they found that only about 13-15% of these subjects appeared capable of formal reasoning.

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[74]Floyd H. Nordland, Anton E. Lawson, and Jane B. Kahle, "A study of Levels of Concrete and Formal Reasoning Ability in Disadvantaged Junior and Senior High School Science Students," Science Education, Vol. 58, No. 4, (1974), p. 569-575.

Some researchers have undertaken efforts to enhance formal thinking in subjects shown deficient therein. Kahn[75] attempted to train EMR and intellectually average adolescents from a low and middle socioeconomic status to think at a formal operational level. One hundred twenty white male subjects from secondary public schools were divided evenly according to the criterion of EMR and average intelligence. Kahn applied his training procedure and found it to be effective in helping increase the subjects' competence on trained tasks. He argues against Piagetian theory noting there are possible training procedures for retarded children that might help them attain certain levels of formal thought. Kahn did not, however, make specific reference as to those levels of formal thought in question.

Siegler and Liebert[76] are presently conducting a series of studies designed to investigate what they termed "scientific reasoning skills" that emerge during the formal operations period. They are "the abilities to generate precise hypotheses,

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[75]James V. Kahn, "Training EMR and Intellectually Average Adolescents of Low and Middle SES for Formal Thought," American Journal of Mental Deficiency, Vol. 79, No. 4, (January 1975), p. 397-403.

[76]Robert S. Siegler and Robert M. Liebert, "Acquisition of Formal Scientific Reasoning by 10 and 13-year Olds: Designing a Factorial Experiment," Developmental Psychology, Vol. 11, No. 3, (1975), p. 401-402.

design and implement efficient experiments, and analyze data systematically." A Chi Square test and a Fisher Exact test are being used to analyze the results. At this point, they note that efforts at inducing these formal scientific concepts in 10 and 11 year olds has been successful with limitations.

Ross,[77] though generally supportive of Piaget's theory concerning formal operational thinking, offers a word of caution to those who espouse this theory as the only explanation of adolescent cognitive development. However, he acknowledges the educational as well as psychological implications of Piaget's works and its greatest potential as a catalyst for research aimed at improving thought processes.

A new dimension is added to the investigation of formal operations when one considers the work of Arlin[78] who states that recent investigations of the Piagetian theory of formal operations suggests that "consistent progressive changes in the thought structures may extend beyond the level of formal operations." Her study systematically searches for new structures. The results are encouraging,

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[77]Robert J. Ross, "The Empirical Status of the Formal Operations," Adolescence, Vol. 9, No. 35, (Fall 1974), p. 413-420.

[78]Patricia K. Arlin, "Cognitive Development in Adulthood: A Fifth Stage?" Developmental Psychology, Vol. 11, No. 5, (1975), p. 602-606.

but far from conclusive. It suggests the need for a thorough investigation to determine the specific formal operations of the problem solving stage that potentially could develop into the new structures of the hypothesized fifth stage period.

This study further investigates Jepsen's findings comparing the relationship of the affective and cognitive developmental structures to the thought processes of normal and emotionally disturbed children. A group of forty 14-year-olds have been investigated using a design similar to Jepsen's in an attempt to replicate his findings with a different age group.

CHAPTER IV

METHOD AND DESIGN

Subjects

A sample of 40 adolescents approximately 14 years of age was chosen as subjects for this study. No subject less than 14 years nor over 14 years 11 months was considered in the sample population. The socioeconomic status of each subject was considered in order to control for relatively consistent environmental experiences.

The subjects comprising the control group consisted of ten boys and ten girls selected at random from a middle school in Tulsa, Oklahoma. The criteria for normality required the child to be making satisfactory academic progress while evidencing no history of any emotional disturbances.

The subjects comprising the experimental group consisted of ten boys and ten girls clinically diagnosed as emotionally disturbed. They were selected from three residential treatment centers for emotionally disturbed children located in Tulsa, Oklahoma: Children's Medical

Center, Tulsa Boys' Home, and Saint Vianney Home for Girls.

Children selected for this group had evidenced emotional instability to the degree that in order to implement the prescribed treatment plan, institutionalization was required. Though experiencing emotional problems, these children were still functioning within the average range of intelligence as determined by their performance on either the Stanford Binet and/or the Wechsler Intelligence Scale for Children. The subjects' records were used to secure this information.

Because of the wide range of criteria employed to classify both the type and degree of emotional disturbances, some necessary guidelines were established to define the term emotional disturbance as it specifically pertained to this group. At the time of testing, each subject was briefly questioned to insure good contact with reality in that no hallucinatory or delusional states were operating. Also, efforts were taken to insure optimum interpersonal communication between the examiner and each subject and to maintain that level of interaction throughout the testing session. Subjects who, by the very nature of their disturbance, were unable to attend adequately to the test material presented, were eliminated from consideration.

Instrument

A battery of Piagetian tasks designed to determine each subject's intellectual developmental progress both for the concrete operational and formal operational stages were administered. Four conservation tasks modeled after Piagetian Theory, (weight, length, area, volume),[79] were combined with three tasks (Separation of Variables, Equilibrium in the Balance, and Combinations of Colorless Chemical Liquids)[80] designed to determine levels of formal thinking.

The following is a description of each task used to comprise the test battery along with the instructions specific to each task. The tasks were cited in the order in which they were presented to the subjects.

Task 1: Conservation of Weight

Two balls of clay of equal size and weight were presented to the subject. Once the subject was satisfied that the clay balls weighed the same, one was flattened into the form of a pancake. Without touching the clay items, the subject was asked if the clay pancake weighed the same as the clay ball.

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[79]John W. Renner et al., "Piaget is Practical", Science and Children, (October, 1971), p. 23.

[80]John W. Renner et al., "Interviewing Protocols for Tasks to Determine Levels of Thought," A Manual Adapted From the Works of Piaget, Inhelder and Szeminska for the Cognitive Analysis Project, University of Oklahoma, 1976.

If he answered "yes", he was questioned as to how he knew that. If he answered "no", it was determined he was unable to conserve weight.[81]

Task 2: Conservation of Length

Two wooden rods identical in length were placed side by side so that the ends of the rods corresponded. Once the subject confirmed they were the same length, one rod was moved so the ends no longer corresponded. At that point, the subject was asked if the rods were the same length. If he answered "yes", he was questioned as to how he knew that. If he answered "no", it was determined he was unable to conserve length.[82]

Task 3: Conservation of Area

Two identical pieces of green construction paper were placed side by side in front of the subject. Ten yellow blocks of wood of identical size and shape were presented to the subject. Once he confirmed that the two pieces of construction paper were the same size and that the ten blocks of wood were the same size and shape, the interviewer proceeded to place five blocks side by side on one piece of

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[81] Op. cit., Jepsen, "Comparison of Conservation Performance of Normal and Institutionalized Emotionally Disturbed Children", p. 29.

[82] Ibid., p. 29-30.

construction paper and five blocks scattered at random on the other piece of construction paper. The subject was asked if the same amount of paper was showing on each piece of construction paper. If he answered "yes", he was questioned as to how he knew that. If he answered "no", it was determined he was unable to conserve area. If the subject counted the blocks when questioned, he was probably conserving number instead of area. To compensate, another block was placed on the sheet with the blocks side by side and one was stacked on top of one block on the sheet with the scattered blocks. The question was repeated. The subject stating more area was showing on the sheet with the stacked blocks was able to conserve area.[83]

Task 4: Conservation of Volume

Two large identical test tubes were presented to the subject. It was called to his attention that each tube supposedly contained equal amounts of water. He was given a medicine dropper and encouraged to make any adjustments in the water level of each test tube in order to satisfy himself that the water levels were the same.

Once he was satisfied, the interviewer presented two metal cylinders noting they were the same size. The cylinders

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[83]Ibid., p. 30-31.

were given to the subject instructing him to hold one in each hand and tell how the cylinders were different. The correct answer is weight. The interviewer then stated that one cylinder would be placed in each tube, both of which would sink to the bottom. The subjects were questioned as to what would happen to the two water levels when the cylinders were submerged into the tubes. The question was stated as follows: "Will the heavier cylinder raise the water level more? Will the lighter cylinder raise the water level more? Or will both cylinders raise the water level the same?"

Then the subject was asked to explain why he believed as he did. Following his explanation, the subject was instructed to lower the lighter cylinder into a tube, then the heavier cylinder and observe the water level. If at this point the subject predicted incorrectly (or correctly with the wrong explanation), he was asked what he thought caused the water levels to remain the same.

This particular task was scored according to a levels system whereby the level attained was determined by a satisfactory performance according to a predetermined criteria characteristic of each successive level. The scoring system is as follows:

Level II-A: The subject made an incorrect prediction or predicted correctly but gave the incorrect reason; or could

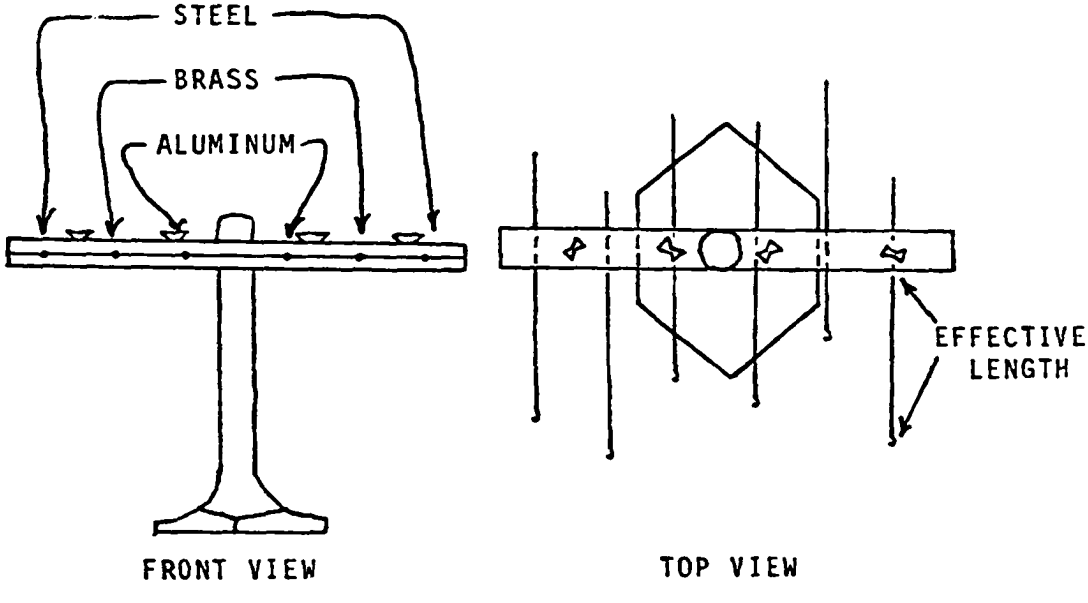
not explain the results when he had performed the experiment.

Level II-B: The subject made an incorrect prediction or predicted correctly but gave the incorrect reason (as in II-A); however, when he saw the experiment performed, he realized the correct explanation.

Level III-A: The subject predicted correctly and provided a correct response.[84]

Task 5: Separation of Variables

The bending rods experiment was used for this task. A "T" shaped apparatus with the horizontal portion divided lengthwise and maintained with clamps allowed the six rods to be adjusted to various lengths.



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[84] Op. cit., Renner, Interviewing Protocols for Tasks To Determine Levels of Thought, p. 3-4.

The interviewer placed the apparatus in front of the subject and demonstrated how it worked. He was instructed how to loosen the clamps to adjust the rods to the length desired generating an explanation of the term "effective length" which is vital to this experiment. Basically, it was demonstrated that the effective length of a rod was from the clamp section to the hook at the end of each rod. The portion of the rod behind the clamped section was disregarded.

The examiner invited the subject to state the ways the rods were different. If necessary, the examiner provided assistance to the subject. The subject should have noted that the rods differed in size (diameter), length, and type of material (one pair of rods is aluminum, one pair brass, and another steel).

The examiner explained to the subject that these differences were called variables. It was important that the subject be able to name the three variables. At this point, weights ranging from 20 grams to 100 grams were introduced as a fourth variable. The examiner demonstrated how the weights could bend the rods.

The subject was instructed to perform a series of experiments showing how each one of the four variables affected the way the rods bent. Ideally, the subject would design and control the experiment whereby the three variables

were held constant and one manipulated. This experiment would be performed for each of the four variables proving the effect of the manipulated variables on the rod.

If necessary, the examiner asked some standardized questions to encourage the subject to perform as many of the four experiments as possible. Throughout the task, the following questions were asked after each experiment: "What are you showing with that experiment? What variable is your experiment dealing with? How does your experiment show what variable you are testing?"

The scoring system for this task was as follows:

Level II-A: The subject cannot explain logical multiplication.

Level II-B: The subject cannot explain logical multiplication, however, he has an intuitive feeling that long and thin balances short and heavy.

Level III-A: The subject performs at least one experiment that proves the effect of one of the variables.

Level III-B: The subject solves the entire problem.[85]

Task 6: Equilibrium in the Balance

An apparatus supporting a balance bar was presented to the subject. The examiner demonstrated that the bar was residing in a balanced position emphasizing it was balanced at the center,

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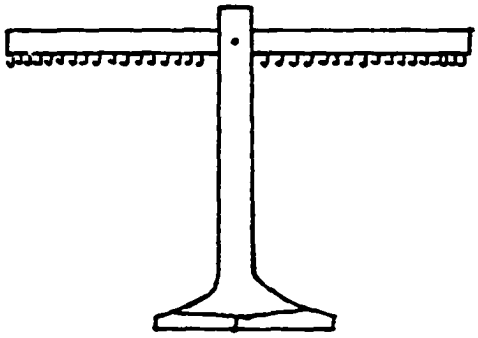
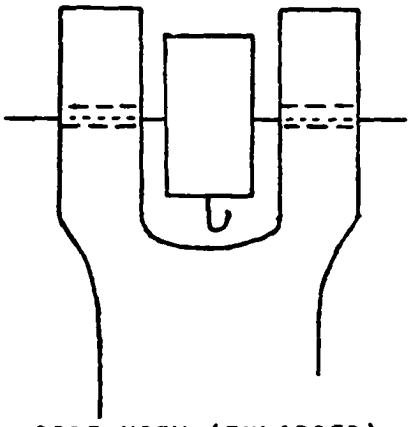
[85]Ibid., p. 5 - 6.

while pointing out that there are 17 evenly-spaced hooks on each side of the balance point on which to hang weights.



FRONT VIEW



SIDE VIEW (ENLARGED)

The examiner explained the experiment involved a series of balance tasks. The procedure required the examiner to place a weight on one side of the bar while holding the bar in a balanced position. Then he gave a weight or weights to the subject and asked him to place the weight on the other side in order to balance the bar. The subject was told he may hang weights on different hooks, or hook the weights together and suspend them from the same hook.

The following is a description of the five balance tasks employed:

1) The examiner placed a 100 gram weight on the sixth hook counting from the center, then gave a 100 gram weight to the subject and asked him to place the weight on the proper hook in order to balance the bar. The subject was asked to explain

his choice before the examiner released the bar.

2) The examiner placed a 100 gram weight on the sixth hook counting from the center, gave two 50 gram weights to the subject and asked him to place the weights in order to balance the bar. The subject was asked to explain his choice before the examiner released the bar.

3) The examiner placed a 100 gram weight on the sixth hook counting from the center, and gave a 50 gram weight to the subject and asked him to place the weight on the proper hook in order to balance the bar. The subject was asked to explain his choice before the examiner released the bar.

4) The examiner placed a 150 gram weight on the third hook counting from the center, and gave a 50 gram weight to the subject and asked him to place the weight on the proper hook in order to balance the bar. The subject was asked to explain his choice before the examiner released the bar.

5) The examiner placed a 70 gram weight on the tenth hook, and gave a 100 gram weight to the subject and asked him to place the weight on the proper hook on order to balance the bar. The subject was asked to explain his choice before the examiner released the bar.

The scoring system for this task was as follows:

Level II-A: The subject was not successful with anything beyond experiment #2.

Level II-B: The subject was successful with the two-to-one ratio of experiment #3. Also, the subject's explanation must incorporate the ratio concept.

Level III-A: The subject was successful balancing the bar in experiment #4. The explanation includes the ratio concept.

Level III-B: The subject successfully balances the bar in experiment #5. The explanation includes the ratio concept.[86]

Task 7: Combinations of Colorless Chemical Liquids

The examiner placed a rack of small test tubes before the subject along with five bottles labeled "1", "2", "3", "4", and "g". Bottle #1 contained diluted sulfuric acid, bottle #2 distilled water, bottle #3 hydrogen perioxide (1.5%), bottle #4 sodium thiosulfate (0.16M), and bottle "g" contained potassium iodide (0.14M).

The examiner called the subject's attention to two test tubes explaining that the clear liquid in each tube could have come from any one of the bottles (1, 2, 3, 4) or any combination of two, three, or all four. At this point bottle "g" was introduced. It was explained that each of the five bottles contained a different liquid. Some liquid from bottle "g" was added to both of the test tubes resulting in a yellow color change for the tube already containing a

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[86] Ibid., p. 7 - 9.

mixture of (1) and (3) and no change for the tube with (2).

The subject was asked to conduct a series of experiments aimed at reproducing the yellow color change in as many different ways as possible. They were asked to name the liquids as they were used to insure an accurate record of the quality and quantity of combinations used.

Piaget and Inhelder provide the following explanation for the chemistry in this task:

> ....hydrogen peroxide oxidizes potassium iodide in the acid medium. This mixture (1 and 3 and g) will yield a yellow color. The water (2) is neutral, so that adding it will not change the color, whereas the thiosulphate (4) will bleach the mixture (1 and 3 and g).[87]

Scoring for this task was as follows:

Level II-A: The subject attempted combinations of a single liquid with "g" or all four with "g", without testing any other combinations. Any hypothesis was classified as quantitative and any color change was attributed to a single liquid rather than a combination.

Level II-B: The subject was characterized by the same basic reactions, with the addition of some n x n combinations with "g", or n x n x n combinations with "g". The subject's system was empirical and the color attributed to one liquid.

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[87]Barbel Inhelder and Jean Piaget, The Growth of Logical Thinking, Basic Books, New York, 1958, chapter 7. As cited by Renner on page 10 in the manual "Interviewing Protocols for Tasks to Determine Levels of Thought."

Level III-A: The subject's performance was characterized by the appearance of a systematic method in the use of n x n combinations and an understanding that color was a product of a combination of liquids rather than a single liquid. The subject continued to test other combinations in order to compute the combinatorial system.

Level III-B: The difference between this level and the preceding level is only one of degree. The experiment is organized in a more systematic fashion. Thus, the subject understands the task and solves it much faster.[88]

Procedure

The complete test battery was administered individually to each subject. All test items were placed on a table in view of the subject as he entered the test room. After completing a short information form, the examiner made the following statement:

> "As I mentioned to you earlier, this is simply my personal research project. It is not a test. Your performance here will not affect your grades in any way. Do not be concerned whether your answers are right or wrong. I am more interested in how a person your age approaches certain tasks. Some tasks you will find more difficult than others, but please do the best you can. I might add there are no "trick" questions. If you don't mind, I would like to record this session in order to have an accurate

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[88]Op. cit., Renner, Interviewing Protocols for Tasks to Determine Levels of Thought, p. 10 - 12.

record of our conversation. Do you have any questions? Let's begin."

A scoring system was devised whereby a possible 2 points was awarded for the successful completion and satisfactory explanation of each of the first three conservation tasks (weight, length, and area). Points for the remaining tasks were accumulated according to the specific level reached for each task and scored individually for each of the four remaining tasks (Conservation of Volume, Separation of Variables, Equilibrium in Balance, and Combinations of Colorless Chemical Liquids) at the following rate:

1) Level II-A = 1 point
2) Level II-B = 1 point
3) Level III-A = 1 point
4) Level III-B = 1 point

As a result, each subject could receive a maximum score of 21 points for a perfect performance on the complete test battery. (See Graph 10, page 79).

Hypotheses

This study investigated the following hypotheses, stated in the null form using a t-test and setting the alpha level at .05:

Hypothesis 1: Based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for normal

adolescents and institutionalized emotionally disturbed adolescents.

Hypothesis 2: Based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for normal males and institutionalized emotionally-disturbed males.

Hypothesis 3: Based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for normal females and institutionalized emotionally-disturbed females.

Hypothesis 4: Based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for institutionalized emotionally-disturbed males and institutionalized emotionally-disturbed females.

Hypothesis 5: Based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for normal males and normal females.

CHAPTER V

RESULTS

The data obtained was statistically analyzed through the use of a t-test in order to compare the mean levels of test battery performance of normal and emotionally disturbed adolescents. The results of the analysis were as follows:

Hypothesis 1 states that based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for normal adolescents and institutionalized emotionally disturbed adolescents. In view of the results shown in Table 1, page 72, Hypothesis 1 is rejected.

Hypothesis 2 states that based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for normal males and institutionalized emotionally disturbed males. At the .05 level of confidence, a t-test score of 1.012 indicates no statistically significant difference between the levels of performance of normal and institutionalized emotionally disturbed adolescent males. In view of the

results shown in Table 2, page 72, Hypothesis 2 is not rejected.

Hypothesis 3 states that based on the sample population in this investigation, there is no significant difference between the levels of formal thought acquisition for normal females and institutionalized emotionally disturbed females. At the .05 level of confidence, a t-test score of 1.47 indicates no statistically significant difference between the levels of performance of normal and institutionalized emotionally disturbed female adolescents. In view of the results shown in Table 3, page 73, Hypothesis 3 is not rejected.

Hypothesis 4 states that based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for institutionalized emotionally disturbed males and institutionalized emotionally disturbed females. At the .05 level of confidence, a t-test score of 1.487 indicates no statistically significant difference between the levels of performance of institutionalized emotionally disturbed male and female adolescents. In view of the results shown in Table 4, page 73, Hypothesis 4 is not rejected.

Hypothesis 5 states that based on the sample populations investigated in this study, there is no significant difference between the levels of formal thought acquisition for normal males and normal females. At the .05 level of confidence, a

t-test score of .0653 indicates no statistically significant difference between the levels of performance of normal adolescents. In view of the results shown in Table 5, page 74, Hypothesis 5 is not rejected.

CHAPTER VI

DISCUSSION AND CONCLUSION

The results of this study supported the major hypothesis that there is a statistically significant difference between the levels of formal thought acquisition for normal adolescents and institutionalized emotionally disturbed adolescents. This difference was found when the groups were combined as noted in Table 1. However, other between- and within-group comparisons failed to support the remaining hypotheses. This inability to produce statistical significance could probably be attributed to the decreased sample size. However, the major finding of this study appears to augment previous research contending that emotionally disturbed subjects function at a lower level of cognitive development when compared to normals of the same chronological age range,[89] while similar assumptions about more specific comparisons appear to be affected by a smaller sample size.

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[89] Op. cit., Jepsen, "Comparison of Conservation Performance of Normal and Institutionalized Emotionally Disturbed Children."

Although previous research findings have presented contradictory results when relating Piagetian theory to the area of emotional disturbances, it is reasonable to assume that a disturbance in the affective realm subsequently causes a disturbance in the cognitive realm. However, the degree of correlation between the two areas is unknown at this time, only that such a relationship exists.

A comparison between the normal and institutionalized emotionally disturbed groups revealed relative congruence with regard to individual task performance through the first four conservation tasks (weight, length, area, and volume). However, the two groups' performance was notably different for the three formal operational tasks used to complete the test battery. A trend developed suggesting the differences found between the normal and emotionally disturbed groups was influenced most by performance on the three formal tasks. It appeared the normals obtained markedly better scores on these particular tasks indicating the distinct possibility of a trend that would establish even greater statistical difference between the two groups if the primary focus of analysis was limited to the three formal operational measures.

In an attempt to substantiate that superficial trend analysis, additional statistical assessment was performed with the following results: A general comparison of normal

and emotionally disturbed subjects' performance on the three formal measures yielded a t-score significant at the .01 level, representing a notable increase in the level of significance when compared to the total test battery performance for the same two groups (see Table 1). Also, a statistical difference at the .05 level was found between the performances of the normal males and emotionally disturbed males on the formal tasks as opposed to no difference for the same comparison for the total test battery (see Table 2). However, a similar comparison between normal and emotionally disturbed females failed to yield a statistical difference. In view of these findings, it can be generally assumed the formal tasks elicited greater differences between the groups.

As hypothesized, no significant differences in performance for within-group comparisons were seen. The levels of formal thought acquisition for male adolescents in both the normal and institutionalized emotionally disturbed group did not differ significantly from that of the female adolescents in their corresponding group. In essence, the acquisition level for formal thought processes for normal male adolescents did not differ significantly from that of normal female adolescents, and the acquisition level for formal thought processes for institutionalized emotionally disturbed male adolescents did not differ significantly from that of institutionalized

emotionally disturbed females.

Likewise, it was found that between-group comparisons did not reveal significant differences for any cross-matched pairs. In general, normal male adolescents and normal female adolescents did not differ significantly from either institutionalized emotionally-disturbed males or institutionalized emotionally-disturbed females when compared categorically in this way. This analysis does not support significant differences found by Jepsen[90] on identical crossed-group comparisons. However, it is again felt these non-significant comparisons can be attributed to the decreased sample size, thus limiting the degrees of freedom and requiring a higher t-score for significance, as opposed to the total group assessment which doubled the sample size.

Sex difference as a variable does not appear to relate significantly to the acquisition of formal operational thought processes (see Table 6, page 74). These findings concur with the previous research conducted by Jepsen[91], but contrast with other studies[92] which have determined significant differences in performance on various Piagetian tasks to be correlated with sex differences.

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[90] Ibid.

[91] Ibid.

[92] Op. cit., Keating and Schaefer, "Ability and Sex Differences in the Acquisition of Formal Operations", p. 531-532.

Standardized test administration allows for the accumulation of behavioral data through observation which in a clinical setting plays an essential part in the final evaluation. Though not directly incorporated in the design of this study, notable behavioral differences between the two groups is an important consideration that should not be excluded. These observations are, of course, general and characteristic of the groups and were not typical of each individual within the groups.

Individual ego strengths and general personality integration can be assessed by response to stress usually elicited during test situations. Although not substantiated statistically at this time, behavioral differences between the normal and institutionalized emotionally-disturbed adolescents were observed during the administration of the test battery.

The normal adolescents as a group manifested infrequent signs of external anxiety. Controlled anxiety was evidenced when areas of difficulty were encountered during testing, which would be a legitimate expectation. Conversely, the adolescents composing the emotionally disturbed group evidenced anxiety that usually remained present throughout higher levels of testing. This prolonged anxiety undoubtedly impaired their ability to attend to the immediate stimuli of

the test situation thus impeding from test performance.

Psychologically, it is known that anxiety is one of the major pathological signs characteristic of a wide range of emotional difficulties. An individual's ability to cope with anxiety is an important indicator as to the strength of his psychological organization.[93]

Anxiety as related to stress situations was the most general difference observed between the two groups; however, there are others. It was noted that the emotionally disturbed group had a lower level of frustration tolerance than did the normal group. As a result, their motivational level was lower as well. Impulsive behavior was commonly seen in the emotionally disturbed group while a more methodical controlled behavior characterized the normal group.

There were pronounced clinical differences in self-concept formation between the two groups. As a group the normal adolescents both verbally and non-verbally appeared more confident and secure in their performance. Typically, the emotionally disturbed group seemed surprised when a task was completed successfully. This was not the case for the normal group.

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[93]Farber, I. and Spence, K., "Complex Learning and Conditioning as a Function of Anxiety", Journal of Experimental Psychology, 1953, No. 45, p. 123.

Depressed states were observed in some of the emotionally disturbed adolescents, resulting in slow and indifferent responses. There was a marked inability to assimilate information and structure responses based on that information.

It would seem logical to assume that pathological characteristics are interdependent, each contributing to the overall dynamics of the emotional structure. Again, it is necessary to remember that the preceding statements are based on clinical observations and have not been confirmed through statistical analysis. Also, these observations are general and assumed to be characteristic of the two groups and not the specific individuals within the groups.

The results of this study support the hypothesis that a disturbance in the affective realm will be positively correlated with a disturbance in the cognitive area of the developmental process. Thus, Piaget's statement that affective development and cognitive development are both parallel and interdependent is supported.[94]

Since Piaget's theory proposes that the same levels of organization apply to both the affective schema and the cognitive schema at each stage of development, it would

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[94]Op. cit., Piaget, Play, Dreams and Imitation in Childhood., p. 23.

appear that developmental delays in the affective structure would impose similar limitations on the cognitive structure and vice versa. This contamination process appears circular in nature because this interdependence between structures is self-perpetuating.

In addition, this interdependent disturbance between the affective and cognitive structures impairs reality testing in that cognitive processes essential to the assimilation and integration of our environmental experiences are deemed inoperable. The emotionally disturbed adolescent has difficulty organizing external stimuli into workable structures vital to the development of coping mechanisms necessary to psychological adjustment. In order for these coping mechanisms to develop it becomes necessary to enlist cognitive structures capable of allowing the adolescent to accurately evaluate his environment and thus enhance his concept of reality.

CHAPTER VII

SUMMARY AND RECOMMENDATIONS

The purpose of this study was to determine whether or not the development of the formal operational thought processes of institutionalized emotionally-disturbed adolescents would be significantly impaired as compared to normal adolescents of the same chronological age with no history of emotional problems. Also, the influence of sex difference upon the development of formal operational thought was investigated. The Piagetian concepts of cognitive development provided the theoretical basis for this study. According to Piaget, affective development is viewed as a part of cognitive development and thus both are governed by the laws of organization at each stage of development. This investigation extended Jepsen's research to a higher chronological age level in an attempt to support his findings indicating that a disturbance in the affective realm could be correlated to a disturbance in the cognitive realm of intellectual development.

An experimental group of 20 institutionalized

emotionally disturbed adolescents, 10 males and 10 females, and a control group of 20 normal adolescents, 10 males and 10 females of approximately 14 years of age were administered a test battery composed of four conservation tasks (weight, length, area, volume) and three formal operational tasks (Conservation of Volume, Separation of Variables, Equilibrium in Balance, and Combinations of Colorless Chemical Liquids).

The following results were obtained:

I-- A t-test comparing the composite scores of the normal adolescents and institutionalized emotionally-disturbed adolescents indicated a significant statistical difference in the acquisition of formal operational thought processes. The institutionalized emotionally-disturbed adolescents scored significantly lower on the standardized test battery.

II-- A t-test comparing the composite scores of the normal male adolescents and institutionalized emotionally-disturbed males indicated no significant statistical difference in the acquisition of formal operational thought processes.

III-- A t-test comparing the composite scores of normal female adolescents and institutionalized emotionally-disturbed females indicated no significant statistical difference in the acquisition of formal operational thought processes.

IV-- A t-test comparing the composite scores of institutionalized emotionally-disturbed males and institut-

ionalized females indicates no significant statistical difference in the acquisition of formal operational thought processes.

V-- A test comparing the composite scores of normal male adolescents and normal female adolescents indicated no significant statistical difference in the acquisition of formal operational thought processes.

The results of this study indicate that institutionalized emotionally-disturbed adolescents as a group are functioning at a significantly lower level on a formal thought development continuum than are normal adolescents. Sex differences had no significant effect on formal thought acquisition performance. This investigation supports the contention that a disturbance in the affective area of the developmental process correlates with a disturbance in the cognitive structures as well.

This study has implications for future research primarily in the areas of education and clinical diagnosis and psychotherapy. At this point, however, additional research is needed to clarify conflicting results from various studies concerning the relationship of affective and cognitive structures as they related to emotional disturbances and intellectual development within the Piagetian model.

From a clinical diagnostic orientation, research

attempting to compare the performance of patients with specific emotional disorders (i.e., anxiety neurosis, obsessive-compulsive neurosis, etc.), on a standardized battery of concrete operational and formal operational tasks such as the one used in this study would be beneficial. If significant differences could be obtained, perhaps new diagnostic tools could be constructed incorporating certain Piagetian tasks that are considered appropriate. Also, an increased knowledge as to the level of cognitive functioning of the emotionally-disturbed individual and an understanding of its affective correlation would undoubtedly refine the overall psychotherapeutic process from the formulation of the treatment plan completely through to the actual selection and implementation of the appropriate treatment modality.

Perhaps education is the discipline that could benefit even more from future Piagetian research specifically with reference to the construction of an academic curriculum to meet the unique demands of educating the emotionally-disturbed individual. If future research in this area strengthens the hypothesis that a concomitant relationship exists between affective and cognitive structures, then the education of the emotionally disturbed individual would be vital not only for the purposes of academic advancement but

also as an integral treatment modality within the total psychotherapeutic milieu of an institutional setting.

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APPENDIX

TABLE 1

T-TEST RESULTS BETWEEN NORMAL AND INSTITUTIONALIZED EMOTIONALLY DISTURBED CHILDREN

Group	N	$\bar{X}$ score	Variance	t-ratio		Level of Significance
Normal	20	15.05	9.20	1.769		p .05
Emotionally Disturbed	20	13.5	6.15		df=38	

TABLE 2

T-TEST RESULTS BETWEEN NORMAL MALES AND EMOTIONALLY DISTURBED MALES

Group	N	$\bar{X}$ score	Variance	t-ratio		Level of Significance
Normal	10	15.5	11.17	1.012		.05
Emotionally Disturbed	10	14.3	2.90		df=18	

TABLE 3

T-TEST RESULTS BETWEEN NORMAL FEMALES AND EMOTIONALLY DISTURBED FEMALES

Group	N	$\bar{X}$ score	Variance	t-ratio	Level of Significance
Normal	10	14.60	7.82	1.47	.05
Emotionally Disturbed	10	12.70	8.68	df=18	

TABLE 4

T-TEST RESULTS BETWEEN EMOTIONALLY DISTURBED MALES AND EMOTIONALLY DISTURBED FEMALES

Group	N	$\bar{X}$ score	Variance	t-ratio	Level of Significance
Males	10	14.30	2.90	1.487	.05
Females	10	12.70	8.68	df=18	

TABLE 5

T-TEST RESULTS BETWEEN NORMAL MALES AND NORMAL FEMALES

Group	N	$\bar{X}$ score	Variance	t-ratio	Level of Significance
Males	10	15.50	11.17	.0653	.05
Females	10	14.60	7.82	df=18	

TABLE 6

T-TEST RESULTS BETWEEN MALES AND FEMALES

Group	N	$\bar{X}$ score	Variance	t-ratio	Level of Significance
Males	20	14.9	7.04	1.406	.05
Females	20	13.65	8.77	df=38	

TABLE 7

DISTRIBUTION OF CUMULATIVE TEST BATTERY SCORES FOR NORMAL MALES

S	CA	Weight		Length		Area		Volume			Rods				Balance				Chemicals				Total
		J	E	J	E	J	E	IIA	IIB	IIIA	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	Score
1	172	1	1	1	1	1	1	1	1		1	1			1				1	1			13
2	169			1	1			1	1		1	1			1				1	1			9
3	172	1	1	1	1	1	1	1	1		1	1			1				1	1			13
4	177	1	1	1	1	1	1	1	1	1	1	1			1	1	1		1	1			16
5	176	1	1	1	1	1	1	1	1		1	1			1	1	1		1	1			15
6	171	1	1	1	1	1	1	1	1		1	1			1	1	1		1	1			15
7	168	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		20
8	174	1	1	1	1	1	1	1	1		1	1			1	1	1	1	1	1			16
9	174	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	19
10	176	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		19

S = Subject

CA = Chronological Age (months)

J = Judgment

E = Explanation

$\overline{X}$ age = 172.9

$\overline{X}$ score = 15.50

TABLE 8

DISTRIBUTION OF CUMULATIVE TEST BATTERY SCORES FOR NORMAL FEMALES

S	CA	Weight		Length		Area		Volume			Rods			Balance				Chemicals				Total
		J	E	J	E	J	E	IIA	IIB	IIIA	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	Score
1	172	1	1	1	1	1	1	1			1	1			1	1			1	1			13
2	169	1	1	1	1	1	1	1	1	1	1	1			1	1	1		1	1			16
3	171	1	1	1	1	1	1	1	1		1	1			1	1			1	1			14
4	168	1	1	1	1			1			1				1				1	1			9
5	170	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		1	1	1		18
6	171	1	1	1	1	1	1	1	1		1				1	1			1	1			13
7	168	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1			18
8	170	1	1	1	1	1	1	1	1		1	1			1	1	1		1	1			15
9	172	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		1	1			17
10	172	1	1	1	1	1	1	1	1		1	1			1				1	1			13

S = Subjects

CA = Chronological Age (months)

J = Judgment

E = Explanation

$\bar{X}$ age = 170.3

$\bar{X}$ score = 14.90

TABLE 9

DISTRIBUTION OF CUMULATIVE TEST BATTERY SCORES FOR EMOTIONALLY DISTURBED MALES

S	CA	Weight		Length		Area		Volume			Rods				Balance				Chemicals				Total
		J	E	J	E	J	E	IIA	IIB	IIIA	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	Score
1	178	1	1	1	1	1	1	1			1	1	1		1	1	1		1	1			15
2	177	1	1	1	1	1	1	1	1	1	1	1			1	1	1		1	1			16
3	177			1	1	1	1	1			1				1	1	1		1	1			11
4	173	1	1	1	1	1	1	1	1	1	1	1	1		1				1	1	1		16
5	172	1	1	1	1	1	1	1	1	1	1	1			1	1			1	1			15
6	178	1	1	1	1	1	1	1	1	1	1				1	1	1		1	1			15
7	172	1	1	1	1	1	1	1	1	1	1				1				1	1			13
8	176	1	1	1	1	1	1	1	1		1				1	1			1	1			13
9	178	1	1	1	1	1	1	1	1	1	1	1			1	1	1		1	1			16
10	169	1	1	1	1	1	1	1	1	1	1				1				1	1			13

S = Subject

CA = Chronological Age (months)

J = Judgment

E = Explanation

$\bar{X}$ age = 175.0

$\bar{X}$ score = 14.30

TABLE 10

DISTRIBUTION OF CUMULATIVE TEST BATTERY SCORES FOR EMOTIONALLY DISTURBED FEMALES

S	CA	Weight		Length		Area		Volume			Rods				Balance				Chemicals				Total
		J	E	J	E	J	E	IIA	IIB	IIIA	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	IIA	IIB	IIIA	IIIB	Score
1	172	1	1	1	1	1	1	1			1				1				1	1			11
2	177	1	1			1	1	1			1				1				1	1			9
3	174	1	1	1	1	1	1	1	1		1	1			1				1	1			13
4	168	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1		1	1	1	1	19
5	173	1	1	1	1	1	1	1			1				1	1	1		1	1			13
6	172	1	1	1	1	1	1	1			1				1				1	1			11
7	177	1	1	1	1			1	1	1	1				1				1				10
8	179	1	1	1	1	1	1	1	1	1	1				1	1	1	1	1	1			16
9	178	1		1	1	1	1	1	1	1	1				1	1			1	1			13
10	175	1	1	1	1	1	1	1	1		1				1				1	1			12

S = Subject

CA = Chronological Age (months)

J = Judgment

E = Explanation

$\bar{X}$ age = 174.5

$\bar{X}$ score = 12.70

TABLE 11

INDIVIDUAL TEST BATTERY SCORE SHEET *

NAME: JOHN DOE COMPOSITE SCORE: 18

DATE OF BIRTH: 5-31-61 SEX: Male

AGE: 14-10 GROUP: Control

TESTING DATE: 3-20-76

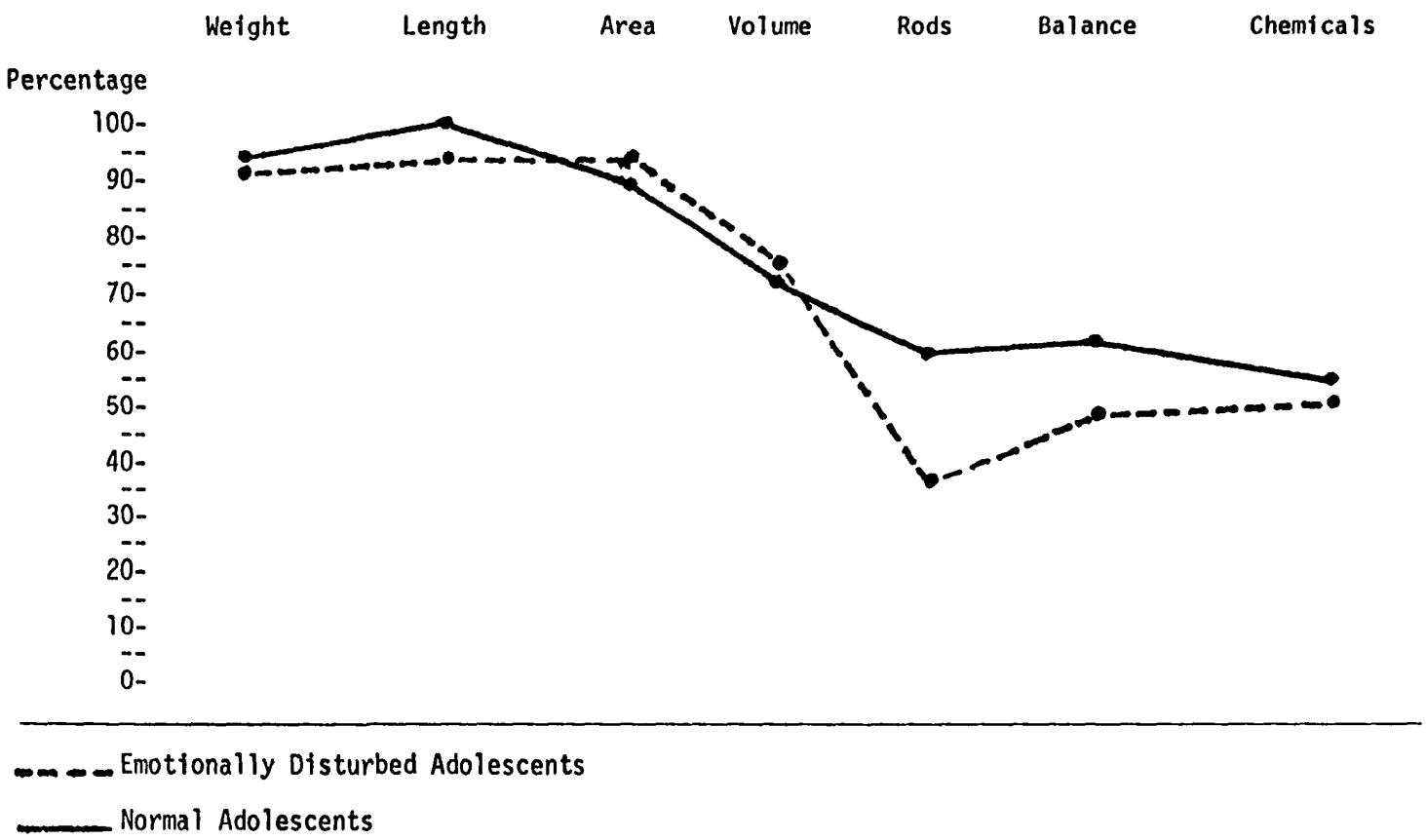
TASK	JUDGMENT	EXPLANATION
Weight	1	1
Length	1	1
Area	1	1

	IIA	IIB	IIIA	IIIB
Volume	1	1	1	XX
Rods	1	1	1	1
Balance	1	1	1	
Chemicals	1	1		

* Sample Score Sheet

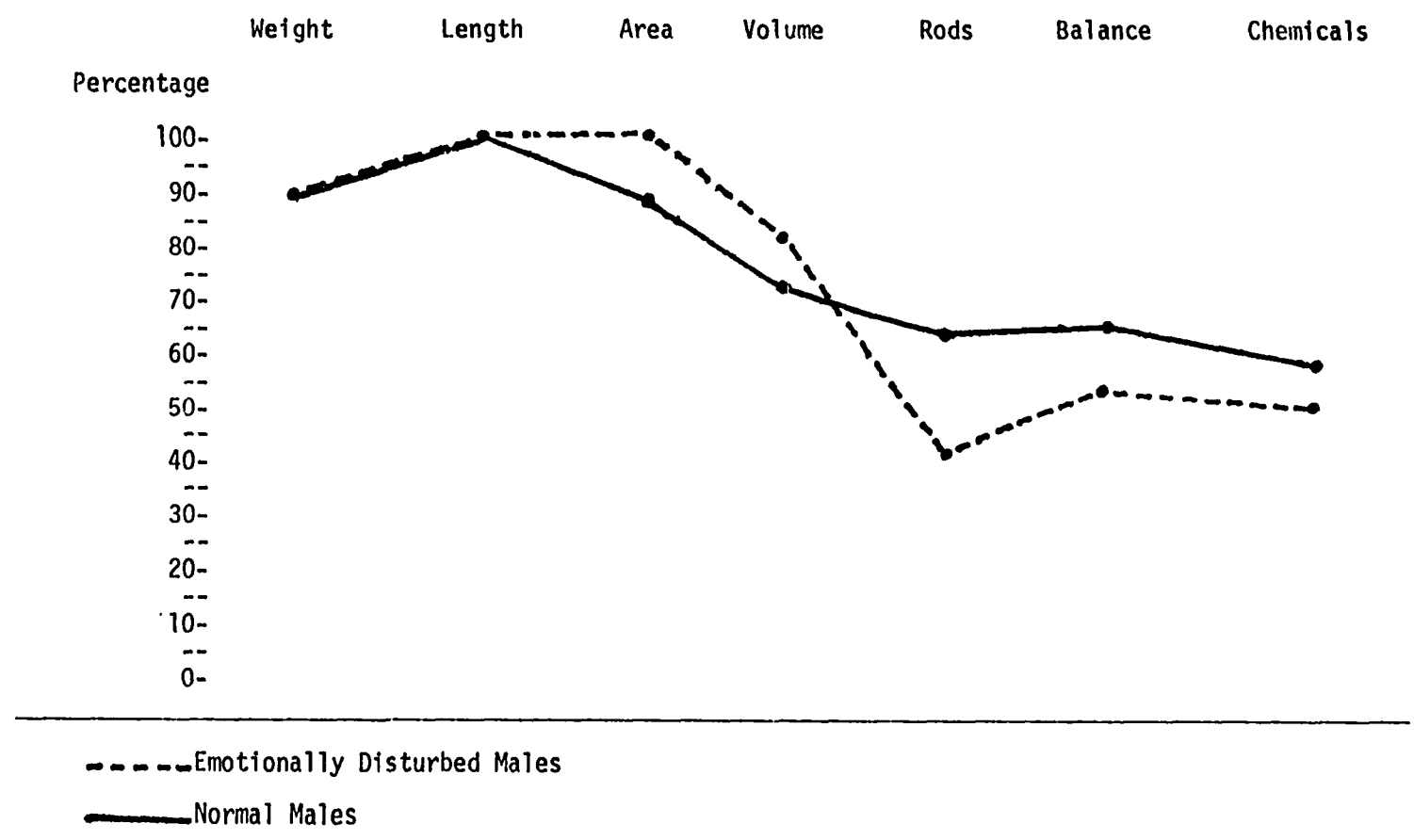
GRAPH 1

COMPOSITE TEST BATTERY PROFILE FOR NORMAL VS. EMOTIONALLY DISTURBED ADOLESCENTS



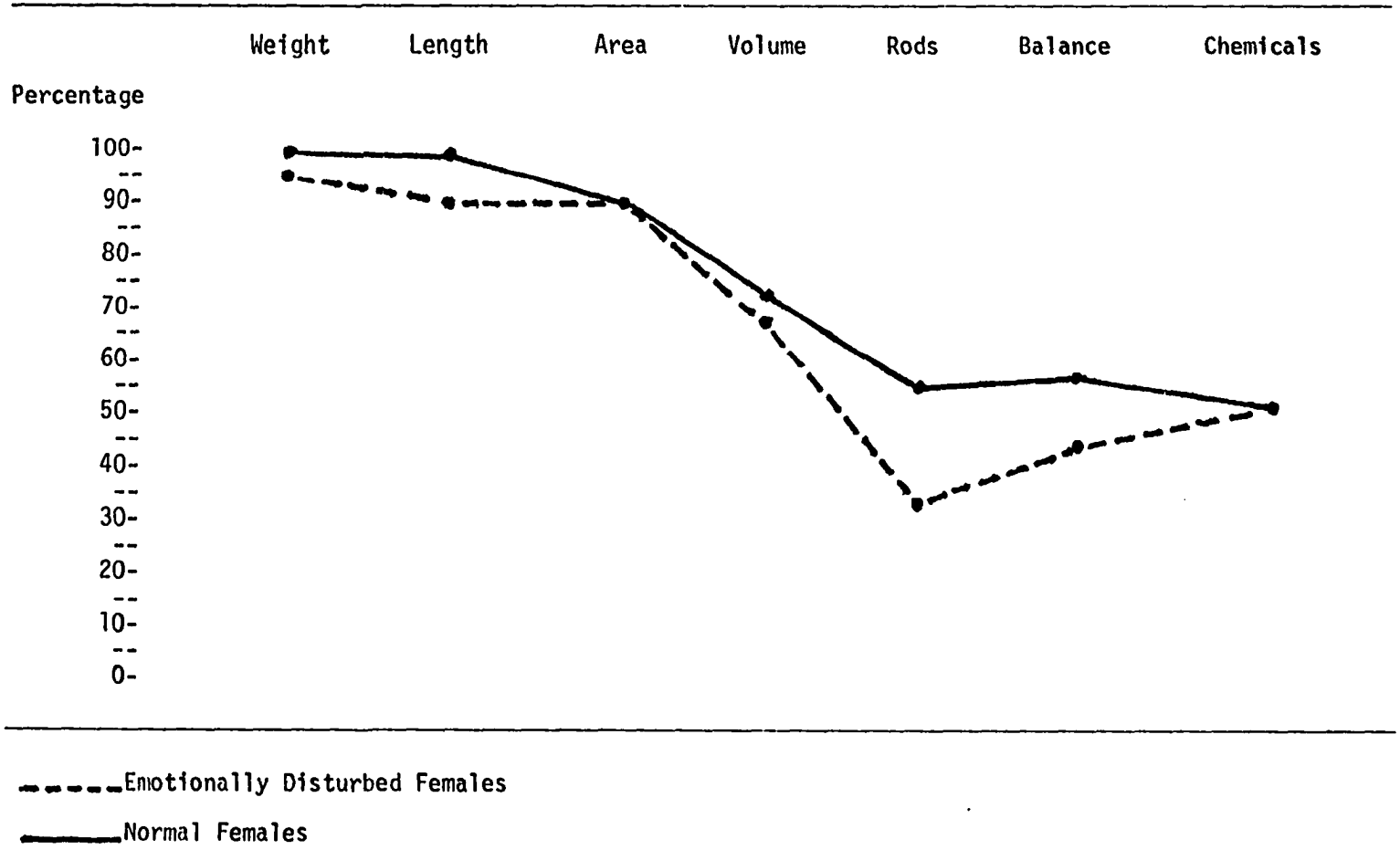
GRAPH 2

COMPOSITE TEST BATTERY PROFILE FOR NORMAL MALES VS. EMOTIONALLY DISTURBED MALES



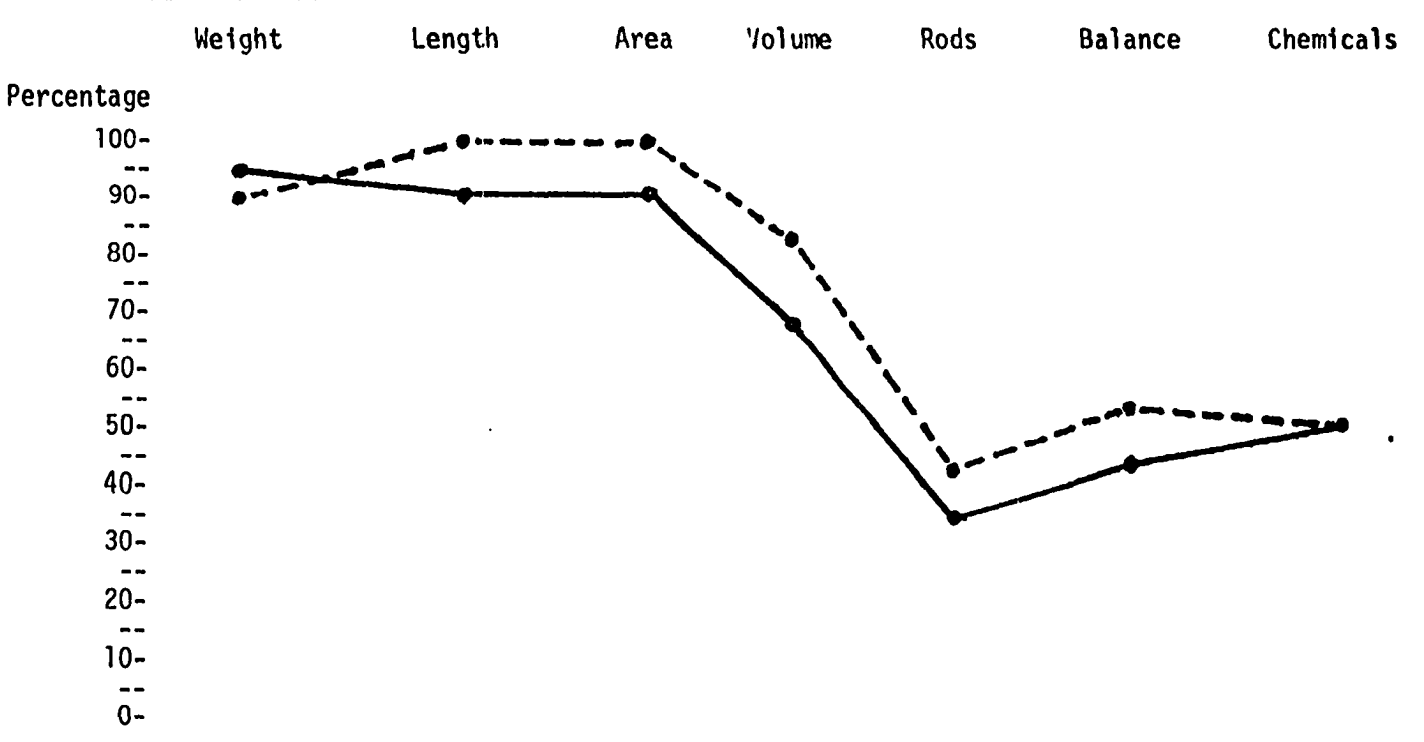
GRAPH 3

COMPOSITE TEST BATTERY PROFILE FOR NORMAL FEMALES VS. EMOTIONALLY DISTURBED FEMALES



GRAPH 4

COMPOSITE TEST BATTERY PROFILE FOR EMOTIONALLY DISTURBED MALES VS. EMOTIONALLY DISTURBED FEMALES



GRAPH 5

COMPOSITE TEST BATTERY PROFILE FOR NORMAL MALES VS. NORMAL FEMALES