THE STRUCTURE OF THOUGHT IN SCHIZOPHRENIC CHILDREN: A PIAGETIAN ANALYSIS

by

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Abstract

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Ten male patients from eight to ten years of age, hospitalized at the New York State Psychiatric Institute, were administered five Piagetian tasks: one-to-one correspondence, seriation, conservation of matter, conservation of length, and class inclusion. Each child met the following criteria: (1) diagnosed as schizophrenic, (2) of average intelligence, (3) from eight to ten years of age, inclusive.

These ten schizophrenic children were found to be overall at the preoperational level of thought, in comparison to concrete operational children of comparable age. In addition, none of the schizophrenic children achieved the five tasks in the same order as Piaget found for normal children. The qualitative analysis of the specific responses of the schizophrenic children revealed several unusual types of responses: (1) intellect as justification, (2) suspicious responses, (3) concrete responses, and (4) emotional responses. These responses were much more likely to occur on those tasks which were not achieved at the concrete operational level than on those tasks which were achieved at that level.

The conclusion of this dissertation is that the presence of disordered thinking in schizophrenic children is determined by two factors: (1) the structural features of the child's thought, and (2) emotional factors which intervene to determine the content of the child's specific responses.

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CHAPTER I

REVIEW OF THE LITERATURE

Introduction

Eugene Bleuler (1913), in his manuscript first published in 1911, described schizophrenia as "a disease characterized by a specific type of alteration of thinking, feeling, and relation to the external world which appears nowhere else in this fashion." He considered the primary symptom of schizophrenia to be a disturbance of association. In the DSM-II (1952), the disgnostic manual currently used by most clinicians, the mental status of schizophrenics is described as due primarily to a thought disorder. From its earliest conceptions to the present day, the emphasis in the definition of adult schizophrenia has been on disordered thinking.

The relationship between a disturbance of thinking and the diagnosis of childhood schizophrenia, however, has never been as clear. In 1933 Potter asserted, "Children are essentially beings of feeling and behavior. Consequently their psychopathology may be expected to be expressed largely through affective responses and altered behavior patterns." Potter was one of the first investigators to urge that consideration be given to the developmental level of the child when making the diagnosis of childhood schizophrenia. However, in the 1930's, the qualitative ways in which a child's thinking differed from an adult's were not used extensively by most investigators. As Goldfarb (1961) argues, "psychiatrists (until recent years) had no standards for weighing

a child's incomplete and inadequate reality testing, or his primitive thinking and uncertainty about his personal identity. Indeed, they had no way of differentiating such symptoms from normal childhood behavior."

Piaget has provided child psychology with a theory of the normal development of cognition, and has well delineated the ways in which a child's thinking differs from an adult's. His theory rests on the fundamental assumption that the development of logical, rational thought follows certain stages, invariant in their sequence. It has stood both the test of time and of experimental validation.

In view of this, it is surprising that Piaget's theory has not been applied more extensively to child psychopathology. Even today, very little is known about how a schizophrenic child thinks--about how his thinking differs from that of a normal child. The role a disorder of thinking should play in the diagnosis of childhood schizophrenia is still unclear. The report of the British Working Party (Creak, 1961), for example, lists nine points which are characteristic of what it terms "the schizophrenic symdrome of childhood." Not one of these points refers to a specific disorder of thinking.

The purpose of this study is to analyze the structure of thought processes of schizophrenic children. The objectives are as follows:

1. To provide clinical observations on thought processes in schizophrenic children.

2. To describe the organization of these processes in these children.

3. To establish structural laws of internal cognitive organization in these children.

4. To provide a conceptually new framework, dealing with the relationship between cognition and affect in these children.

In order to achieve these objectives, clinical interviews grounded in Piaget's clinical method were conducted. These interviews were primarily focused on the cognitive functioning of schizophrenic children. That the clinical method of observation can shed light on the organization, the structure and functioning of cognition among children is a well-established fact. Piaget (1929) argues:

> ... observation must be at once the starting point of all research dealing with child thought and also the final control on the experiments it has inspired. (p. 4)

It was the intent of this study to make use of Piaget's findings and experimental approach for the completion of the objectives of this research.

Definition of Childhood Schizophrenia

Before turning to the literature on thinking in childhood schizophrenia, it is first necessary to approach perhaps the most confusing issue in the area of psychosis in childhood--the issue of diagnosis. It is not my purpose to review the extensive literature on childhood schizophrenia, for this has been admirably accomplished by others--especially Goldfarb (1961) and Ekstein et al.

(1958). Although the literature on childhood schizophrenia is vast, there is still little agreement on the diagnostic criteria for this disorder. Hirschbert and Bryant (1954) listed seven overlapping groups, all described at one time or another as childhood schizophrenic. (I will quote Group I and summarize the others.)

1. The nuclear schizophrenic child who, from a "developmental lag at the embryonic level," reveals pathology in behavior at every level and in every area of integration or patterning within the functioning of the central nervous system, be it vegetative, motor, perceptual, intellectual, emotional or social (Bender, 1947).

2. Children with early infantile autism, as described by Kanner (1942).

3. Children with a symbiotic psychosis, as described by Mahler (1942).

4. The very young, severaly disturbed child, who shows unusual sensitivities (Bergman & Escalona, 1949).

5. Children with organic brain symdromes who develop severe emotional problems and a schizophrenia-like type of adjustment (Fuller, 1954).

6. The borderline psychotic child as described by Ekstein (1966).

7. The "pseudo-schizophrenic" child, with transient symptoms of schizophrenia occurring after a severe emotional trauma (Rank, 1951).

For the purposes of this study, I am primarily concerned with those children described by Lauretta Bender as having childhood schizophrenia (Group I). Many authors feel, and I agree, that Bender's general definition of schizophrenia is too inclusive--that

it also describes children with early infantile psychoses as well as children with organic brain syndromes. Thus, in order to gain more specificity of diagnosis, I have defined as schizophrenic only those children whom Bender (1956) described as "pseudo-neurotic:"

> Children with the pseudoneurotic response present the picture of a pan-neurosis with anxiety, phobias, obsessions, compulsions, hypochondriacal or psychosomatic defenses, concern about body boundary, body image, identity and orientation in time and space. They have disturbed thought processes, distrubed speech, sensory distortions, exaggerated or unusual introjections and projections, they often have exaggerated capacity to relate and often with high verbal and graphic capacities and other symbol formation and high intelligence. (p. 499)

This choice was not arbitrary. In recent years, Loretta Bender has been associated with the New York State Psychiatric Institute, and she has had considerable influence in their diagnostic practices. The subjects in this study were all obtained from the Psychiatric Institute. (The specific diagnostic criteria used by the Psychiatric Institute will be discussed more fully in Chapter II.) The purpose of choosing Bender's diagnostic criteria was to control for the variability of diagnoses by the common philosophical background of the diagnosticians at the Psychiatric Institute. There are, however, other advantages in using Bender's criteria: her studies of schizophrenic children remain unsurpassed in scope, and her clinical descriptions are among the most thorough.

Approaches to the Study of Thought in Childhood Schizophrenia

Volumes have been devoted to the study of thinking in adult schizophrenia, and scores of experiments have been carried out. The research literature on thinking in childhood schizophrenia, however, has been rather scant. Not surprisingly, much of the research in childhood schizophrenia has conformed to conceptual paradigms used to study thinking in adult schizophrenia. The two paradigms of research have been based on the concepts of (1) thought disorder, and (2) abstract and concrete thinking.

My analysis is organized as follows: First, I will review the research that used the conceptual paradigms of thought disorder and abstract and concrete thinking to study thinking in childhood schizophrenia. Then, I will review a third approach to the study of thought in childhood schizophrenia, the approach that is to be used in this study--the Piagetian approach. Let me stress again that the Piagetian theory of normal cognitive development has not been extensively applied to the area of psychopathology. However, it seems uniquely suited to the study of thought in childhood schizophrenia because it is an approach which is well integrated and based on extensive developmental data on thinking in children.

1. Thought Disorder

In general, thought disorders have been subsumed under one of two categories: either a disturbance in the flow of thought (which includes such phenomena as blocking or pressure of ideas) or a disturbance in the form of thoughts (which includes such phenomena as delusions and hallucinations).

Disturbances in the Flow of Thought. In his classic work, Dementia Praecox, or the Group of Schizophrenias, Eugene Bleuler (1952) designated a disturbance of association as the primary disorder in adult schizophrenia.

> Often ideas are only partially worked out, and fragments of ideas are connected in an illogical way to constitute a new idea. Concepts lose their completeness, seem to dispense with one or more of their essential components; indeed, in many cases they are only represented by a few truncated notions.
>
> Thus, the process of association often works with mere fragments of ideas and concepts. This results in associations which normal individuals will regard as incorrect, bizarre, and utterly unpredictable. (p. 9)

By primary symptom, Bleuler means that all other symptoms are a direct consequence of this loosening of associations. Bleuler also emphasizes the bizareness and incomprehensibility that results from this distrubance. However, this analysis does not inform us on the intent, the functioning, and the structure of thought disturbances. To merely state that thought processes are bizarre does not imply by necessity that they are unorganized or incomprehensible.

Disturbances in the Form of Thought. In this category are included all deviations from rational, logical, goal-directed thinking. The disturbances in the form of thought are primarily

encompassed by one label: autistic thought. Bleuler coined the term autism and described it as follows: "This detachment from reality, together with the relative and absolute predominance of the inner life, we term autism." Bleuler believes that autistic thinking occurs in normal individuals who are under severe emotional stress, in children's play, and in myths. He states:

> Autistic thinking obeys its own special laws. To be sure, autistic thinking makes use of the customary logical connections **insofar** as they are suitable, but it is in no way bound to such logical laws. Autistic thinking is directed by affective needs; the patient thinks in symbols, in analogies, in fragmentary concepts, in accidental connections. (P. 67)

Bleuler sees autistic thinking as a direct result of the loosening of associations in schizophrenia: because the associations are "loose," all associations conflicting with emotionally charged complexes are excluded. The loosening of associations, however, does not explain how it is that a schizophrenic patient is able to believe something that is quite obviously not true.

Arieti (1975), in explaining the mechanisms by which the schizophrenic is no longer able to test reality, clearly demonstrates that the schizophrenic is not simply illogical. Some kind of cognitive organization, he asserts, is always present. "He [the schizophrenic] does not think with ordinary logic, but follows <u>different structural organizations</u> that lead to deductions different from those usually reached by the healthy person." Arieti calls this different structural organization "paleologic."

Paleologic thinking patterns, asserts Arieti, are based on

the principle described by Von Domarus (1964): "Whereas the normal person accepts identity only on the basis of identical subjects, the paleologician accepts identity based upon identical predicates." For example, we may say, "All those born in the United States are American citizens. John Doe was born in the United States." The normal, logical conclusion is, "John Doe is an American citizen." Schizophrenic logic would proceed in the following way: The Virgin Mary was a virgin. I am a virgin. Therefore, I am the Virgin Mary.

Arieti believes that almost all schizophrenic delusions are based on paleologic thinking--that is, they are based on a identity of predicates. He describes two types of predicates. The first is a predicate of quality. In the example above, the patient identified herself with the Virgin Mary on the basis of a quality that they both shared--virginity. Another type of predicate is a predicate of contiguity. This can be either a spatial or temporal contiguity. People, things, or events are identified because they occurred at the same time, or at the same place.

The subject of a sentence can have almost an infinite number of predicates. According to Arieti, this accounts for the unpredictable and bizarre quality of schizophrenic thinking. Although the choice of the predicate is determined by emotional factors, the occurrence of this type of thinking cannot be attributed to emotional factors alone.

Arieti explicity disagrees with Bleuler and Levin (1938), both of whom assert that children think autistically in their

play. Arieti finds that children from 1-1/2 to 3-1/2 or even 4 have a tendency to use paleologic modes of thought, but in a normal child this tendency is soon overcome.

Research. Research applying the concept of thought disorder to the study of thinking in childhood schizophrenia has generally been difficult to interpret. One reason for this is that researchers in this area are faced with several difficult decisions--each one certain to affect the results obtained.

The first and perhaps the most difficult decision is in defining who is schizophrenic. However, in addition to the general confusion over acceptable diagnostic criteria, many researchers confuse the issue further by neglecting to mention the criteria by which their subjects were diagnosed as schizophrenic. In addition, most authors define a child as anyone under thirteen years old, but some include in their research adolescents up to seventeen years old.

The second problem that researchers face is deciding the best way to obtain their data. Some researchers use various standardized or projective tests, while others prefer direct analysis of verbal behavior. Although no one method seems preferable, the method used to obtain the data affects the kind of data obtained. The Rorschach, for example, is likely to elicit fantasy material, while an intelligence is not.

The third problem facing researchers in this area concerns

the use of a control group. Some authors are primarily descriptive in their approach and do not use a control group at all (although there is often an implied comparison with adult schizophrenics). Other authors compare schizophrenic children with normal children or with disturbed, non-psychotic children.

In general, researchers who have studied thought disorders in childhood schizophrenia have taken one of two positions. The first position is based on the assumption that thinking in adult schizophrenia is regressive and similar to thinking in young children or primitive people. Therefore, schizophrenic children are difficult to diagnose, since they tend to exhibit thought disorders also found in normal children.

The second position assumes that schizophrenic children exhibit disturbances of thought which are quite uncharacteristic of normal children--even very young children. This position assumes that thinking in childhood schizophrenia represents a disorganization of thought, not a regression.

Piotrowski (1950), for instance, supports the first position. In a perceptive and well-reasoned paper, he describes the Rorschach protocols of a schizophrenic boy who was first hospitalized at nine years, then followed for twenty-one years. In a preliminary note on children's Rorschachs, Piotrowski points out the essential problem in evaluating not only children's Rorschachs, but any data based on primarily adult norms:

> Rorschach records of children reveal less than records of adults because the role of children in the interactions between them and the world is less varied, their perception is less comprehensive, their activities less independent, and their experiences less anticipated in their imagination. Certainly what is considered normal in an adult may not be normal for a child, particularly a young one. (Italics mine) (p. 116)

Piotrowski asserts that all children have a tendency to confabulate, that is, "to recite experiences without regard to objectivity and to imagine what is not real." The obvious implication is that it is more difficult to diagnose schizophrenia in a child on the diagnostic criteria of a confabulation than it would be to evaluate it in an adult on the same diagnostic basis. In fact, Piotrowski believes that "no conclusive percepto-analytic signs to aid in the diagnosis of schizophrenia or organic brain disorder have been published as yet."

Cobrinik and Popper (1961), also using the Rorschach, sought to determine the incidence of thought disturbances in childhood schizophrenia, as well as the forms they take at various ages. They tested 48 boys ranging in age from 7-1 to 13-11, all of whom were in residential treatment, and all of whom had been diagnosed as schizophrenic according to Bender's criteria. The mean I.Q. of these children was 86.6.

The authors defined thought disturbance in one of two ways: either as a perceptual distrubance (an F-score on the Rorschach) or as a deviation inthe elaboration of a percept. Deviations in

elaboration were subdivided as follows:

1. Fluidity--rapidly shifting percepts, implying a lack of coherence in the associational process, as well as a more general failure to think in a logical way.

2. Combinatory--bringing together percepts in an incongruous way.

3. Contamination--condensation of separate percepts into a single incongruous response.

4. Confabulation--"building up" of a response in a poorly reasoned way.

5. Illogic--tendency to respond on the basis of false premises.

Cobrinik and Popper found that 25 of the children demonstrated some form of thought disorder, while 23 did not. Their results confirm those of previous investigators, such as Bender, who found a drop in the incidence of thought disorders at adolescence. However, Cobrinik and Popper also found a drop in the occurrence of thought disorders at age nine, a finding which they interpret as the result of possible normal sampling error.

They found that of all the categories of deviation in elaboration, the deviations in fluidity seem to be the most significant: at least one child in each age group demonstrated some fluidity, although it was most prominent in the eight year-old group. In general, however, they found that their schizophrenic children gave relatively few of the classic responses indicative of thought disorder, although many of them did give occasional responses of this kind.

In evaluating the developmental trends, Cobrinik and Popper found that fluidity declined sharply after eight years of age, while all other signs dropped sharply after eleven years. They interpret this to mean that "fluidity would appear to have a largely 'structural' aspect in the sense in which we speak of a patterning of perception." They do not, however, carry their interpretation to its next logical step, and hypothesize a structural basis--with a different time sequence--for the other signs of thought disturbance.

Almost half of the children in their study failed to give any evidence of thought disturbance by their criteria. Cobrinik and Popper suggest that hospitalization may have helped organize some of these children, or the Rorschach may have elicited in some cases only defenses against thought disorders. They conclude that: "what the Rorschach signs of thought disturbance do appear to be associated with in an immediate way is (a) some present interference in the associative process relating to the intrusion of need and other internal distractions and/or (b) an immature organization of experience which may be manifest variously as an immature logic and conceptualization and poor judgment."

Cobrinik and Popper's paper is unusual in that it distinguishes among the various kinds of thought disturbances; it is unique in that it examines thought disorders in schizophrenia developmentally. The most severe criticism which can be given

of their research they themselves raised: "The study of thought disturbance in schizophrenic children must, however, take into consideration the fact that all children demonstrate immaturity in their logical development as well as in the 'sense of reality.'" A comparison with normal children is never mentioned. The comparison is, in fact, in relationship to schizophrenic adults--those who do give classic responses indicative of thought disorder.

As mentioned earlier half of their sample of schizophrenic children showed no evidence of thought disorder by their own criteria. In addition to their explanations, there is another possible (and equally plausible) explanation. Since Bender's general definition of childhood schizophrenia is so broad, it may include many children who would not be diagnosed as schizophrenic by other criteria--such as those with infantile autism, for example. There is some evidence to suggest that children who are psychotic from infancy do not exhibit thought disorders to the same extent that children who become psychotic later in life.

For example, Kolvin et al. (1971) compare thinking in children with early infantile psychoses to thinking in children with what they term "late onset psychosis" (children who have become psychotic from five to fifteen years). Kolvin finds that 60% of the late onset psychosis cases showed a disorder of association of thought, as compared to 14% of the infantile psychosis cases.

Sixty percent of the late onset psychosis cases showed thought blocking and 24% showed autistic thinking. Given that the infantile psychosis cases showed much lower percentages in all areas of thought disorders, Kolvin concludes that "disorders of form and disorder of stream of thought are in the main late onset psychosis phenomena."

One major problem with Kolvin's research is that he does not report how the children's thinking was assessed, except to say that they were all examined by two psychiatrists. However, what is significant about Kolvin's results is that he did find differences in thinking between these two groups. Because of the age of onset, Kolvin's late onset group could be roughly compared to Bender's pseudoneurotic group, the group studied in this paper.

In 1947, DesLauriers and Halpern presented a preliminary descriptive report of their findings after testing approximately one hundred schizophrenic children ranging in age from four to eleven years. These children were given a battery of tests, including an intelligence test, a Rorschach, and generally, a Thematic Apperception Test. They described the distinctively "schizophrenic" characteristics of each of these measures.

In analyzing the I.Q. data they found that, in general, neither the overall I.Q. or any one inter-test pattern was a sufficient diagnostic criteria for childhood schizophrenia.

They did, however, find one characteristic of schizophrenic intra-test performance: "an unexpected and unpredictable break which occurs irregularly in the sequence of his successes. These disturbances are not related directly to the difficulty of the task, but rather appear to be the result of some deviation within the individual." These failures seem to be due not so much to a lack of information as to an unusual association to some irrelevant aspect of the task. In addition, they found that answers which at first seemed satisfactory, upon further questioning were often found to be based on faulty or unusual reasoning.

DesLauriers and Halpern found that they could divide the Rorschach protocols into roughly two groups: those that were similar to protocols of children with organic brain disorders, and those that were similar to protocols of neurotic children. Those protocols which were similar to organic records--abbreviated, with poor form level, perseverative and generally impoverished--could, however, be distinguished from true organic protocols by the approach of the schizophrenic child to the task. "Where the organic child tries to interpret and struggles with the task, the schizophrenic's whole manner indicates either that he wants to be done with the task or that he is so withdrawn from the immediate situation that he is giving it no thought whatsoever." However, if the schizophrenic child did become

aware of the immediate stimulus, he approached the card in a manner also uncharacteristic of the organic child: "he turns it, looks at the back, puts it in his mouth, touches and pats it, etc."

Those protocols which more resembled protocols of neurotic children--lengthy, relatively good form level, rich in intellectual and emotional resources--could also be distinguished from those of true neurotics by the extreme variability of the performance: the sudden appearance of a poor form response on cards where they are least expected; that is, on those plates which are ordinarily considered 'easy' to interpret, a tendency to confabulation, sudden and unexpected refusals of a plate, and extremes of emotional expression after periods of flatness."

DesLauriers and Halpern find that the most outstanding characteristic of the TAT protocols of schizophrenic children is the tendency for their stories to bear little or no relation to the stimulus card, and the frequency of self-reference and autistic thinking.

DesLauriers and Halpern's study is valuable for its clear descriptive analysis. They do not, however, state the criteria which were used to diagnose their children as schizophrenic; neither are they clear as to how many of the children so diagnosed showed the specifically schizophrenic characteristics they described. Generally, DesLauriers and Halpern seem to imply that schizophrenia in children can be distinguished on the basis

of test performances from either neurotic or organic children, and thus that schizophrenic children are different in their test performances from normal children. They in effect support the position that thinking in childhood schizophrenia is quite different from thinking in normal children.

Leitch and Schafer (1947) compare the TAT stories of 15 psychotic and 15 maladjusted non-psychotic children from 5 to 17 years old for indications of thought disturbance. For purposes of diagnosis, they distinguished between schizophrenia and other psychoses of childhood; for purposes of data analysis, however, they did not. They found nine indicators of intellectual disturbances which were present only in the psychotic group; in no instance did they occur in the maladjusted, non-psychotic group. These indicators were (1) incoherence, (2) contradictions, (3) queer verbalizations, (4) neologisms and nonsense rhyming, (5) manneristic speaking, (6) overgeneralizations and symbolic interpretations, (7) introduction of examiner into the story, (8) autistic logic, and (9) themes unrelated to the picture. Three other indicators were found in both groups, although they were found to a significantly greater extent in the psychotic group. These indicators were: (1) repetition of phrases, (2) overspecific statements, and (3) queer ideas.

One difficulty with Leitch and Schafer's paper is that the

sample they used encompassed children from ages five to seventeen, including many adolescents who would conventionally be diagnosed as adult schizophrenics. Also, they did not distinguish childhood schizophrenia from other psychoses of childhood. It would have been useful if they had published the incidence of the various forms of thought disturbances at each age; that is, if they had taken a developmental approach to the analysis of their results.

Leitch and Schafer's paper is valuable, however, because it is one of the few to use a control group. Consequently, the results give a clear indication of those disturbances of thought which do not normally occur in children who are maladjusted, but not psychotic. In general, their results tend to support the second position--they suggest that the thought disturbances which occur in psychotic children are not generally found in normal or even maladjusted, although non-psychotic children. Thus, childhood schizophrenia is for them a disorganization, not a regression.

Despert's (1968) work represents another attempt at confirming this position. She compared tapes of relatively unstructured play sessions of fifteen normal children from ages two to five, with similar tapes of three schizophrenic children (ages 8-4, 8-6, and 13-4). Despert wanted to determine how well normal, young children could distinguish between reality and fantasy, as compared with schizophrenic children.

Despert found that the children's answers to questions regarding the reality of their fantasied play situations fell into three categories: (1) denial of the character of reality, (2) evasion, and (3) reiteration with apparent belief. In the first category the child would spontaneously, or in response to a question, assert his belief in the "make-believe" quality of his play. In the second category were responses which were evasive; that is, the child evaded the question of whether his fantasy play was real or not. Finally, the third category included responses which affirmed what appeared to be illusion or delusion.

Despert found that "a true hallucinatory or delusional character is not demonstrable in the phantasies of the two to five year-old group." In general, the most imaginative children seemed to be the most firmly grounded in reality. Only in one case did Despert find what appeared to be a confusion between fantasy and reality, and this from a girl--four years old--who was emotionally immature and not well-adapted socially. The schizophrenic children, on the other hand, gave ample evidence of autistic thinking, a lack of distinction between reality and fantasy, animate and inanimate, and vague and loosely connected associations.

Despert's purpose, however, was not to precisely delineate the characteristics of thinking in schizophrenic children, but rather to show that thinking in very young, normal children is <u>not</u> similar to schizophrenic thought. She agrees with

Cameron (1938) whom she quotes: "The disorganization that we find (in schizophrenia) proceeds as a whole, and results in something quite unlike the reasoning of children. Evidently the regression does not simply retrace the path of development, but follows instead a path of its own."

In another related paper, Despert (1968) studied more closely the delusional and hallucinatory experiences of psychotic children. She found that above 10 or 11 years, "delusional experiences, including hallucinations, are similar to those of adults, except for their greater simplicity and the total lack of organization and systematization of the delusional content." In the younger psychotic children, delusions were frequently identifications with animals.

Despert expanded her normal comparison group from 15 to 106 children from two to five years old and concluded that:

> ... it can be emphatically stated that there is no evidence of true hallucinations or delusions, either expressed by the children or observed by outsiders at home or at school. (p. 132)

Despert also studied children with behavior and neurotic problems and found that a small number of them did report auditory hallucinations and delusional experiences. However, they were quite simple in nature and isolated from the rest of the child's personality. Usually, they represented a conflict between instinctual demands and taboos.

Although Despert is primarily descriptive in her approach, her findings again lend support to the second position, which assumes that schizophrenic children think quite differently from normal children.

In reviewing the literature on thought disorders in schizophrenic children, several conclusions can be drawn:

1. The majority of researchers in this area have found that schizophrenic children do exhibit disturbances of thinking of the kind described in the literature on adult schizophrenia. Schizophrenic children do exhibit disturbances in the flow of thought, as well as disturbances in the form of thought. It seems, however, that these disturbances occur less frequently than those observed in adult schizophrenics, and in a more simplified form. Also, not all psychotic children show these disturbances. Schizophrenic children who become psychotic later in life are more likely to exhibit these disturbances than children who are psychotic from birth.

2. Researchers in this area have found that the incidence of thought disorders in schizophrenic children drops sharply after eleven years of age. There is some indication that there is also a drop in the incidence of thought disorders at around nine years of age.

3. Finally, researchers in the area of thought disorders

in children have added to our knowledge of thought in normal children as well as schizophrenic children. In general, they find that normal children do know the difference between reality and fantasy, even as young as two to five years of age. Also, they find that normal children do not experience delusions or hallucinations, nor do they show the disturbances of thought that are found in schizophrenic children.

2. Conceptual Thinking

Another paradigm which has been applied extensively to the study of schizophrenia in adults encompasses conceptual thinking. A clear and concise definition of conceptual thinking, however, is somewhat elusive. Vigotsky (1962) defined it as:

> ...the result of a complex activity in which all the basic intellectual functions take part. The process cannot, however, be reduced to association, attention, imagery, inference, or determining tendencies. They are all indispensable, but without the use of the sign, or word, as the means by which we direct our mental operations, control their course, and channel them toward the solution of the problem confronting us. (p. 58)

Vigotsky believed that the ability to think conceptually begins only in adolescence. Prior to adolescence, children think in what he called "complexes." A complex is a simple, elementary type of generalization--a type of association. (Complexes will be described more fully below.)

Research. The paradigm of conceptual thought approaches thinking in childhood schizophrenia from a somewhat different perspective than the paradigm of thought disorder; however, the fundamental issues remain much the same. Vigotsky (1934), one of the leading investigators in this field, compares the thinking of adult schizophrenics to the thinking of normal children:

> In spite of the differences in the process of thought in the child and in the patient with schizophrenia, there is a fundamental similarity in the most essential features. Thus, in persons with schizophrenia, thought is really regressive. (Italics mine.) (p. 1067)

This dilemma is familiar: if thinking in adult schizophrenia is truly regressive and therefore similar to the thought of the normal child, what of the thought of the schizophrenic child? Can it be distinguished from the thought of the normal child, and if so, how? Or is the thinking of a schizophrenic child also regressive, in the sense that it is similar to the thought of a still younger, normal child?

The paradigm of conceptual thought quite naturally lends itself to this kind of confusion, perhaps more than the previous one. Conceptual thought admits of no aberrations of thought, but rather is limited to concrete, functional and abstract levels. The concrete (or complex) level of thought is not pathological per se--only when it is found to an abnormal extent in an adult. If a child's thought is characterized by its concreteness, then, using this paradigm, there is no way theoretically to diagnose pathological thought in childhood--except perhaps through "various levels" of concreteness. Researchers using this paradigm have had to add pathological categories (thought disorders) to describe adequately the responses of schizophrenic children. However, one advantage of research using this paradigm is that the researchers generally take a more developmental point of view than those using the first paradigm.

Vigotsky (1962) describes the development of conceptual

thinking in normal children, using a method today known as the Vigotsky Test. The test material consists of 22 wooden blocks which vary in color, shape, height and size. Underneath each block is written one of four nonsense words: lag, bik, mur, or cev. Regardless of color or shape, lag is written on all tall, large blocks; bik on flat, large blocks; mur on tall, small ones; and dev on flat, small ones. The examiner turns up a sample block and shows the subject that it does not have the same word written underneath it. Eventually, when more and more blocks are turned over the subject comes to realize what characteristics of the blocks the nonsense words refer to.

Based on this test, Vigotsky describes the development of concept formation as occurring in three distinct stages. In the first stage, the child puts together objects into unorganized heaps, without any systematic basis. The second stage is called thinking in complexes. In this type of thought "individual objects are united not only by subjective impressions, but also by bonds actually existing between these objects." The bonds, however, are concrete and factual, rather than abstract and logical. Furthermore, Vigotsky analyzes five different substages in the development of thinking in complexes:

1. In the associative stage, any bond between the nucleus and another object is enought for the child to put it into the nuclear group.

2. The child's groupings are called collections when the objects are placed together on the basis of some one trait in which they differ and consequently complement one another. Vigotsky also called this a functional grouping.

3. A chain complex describes a grouping with no nucleus. Rather, it is the consecutive joining of individual links.

4. A diffuse complex is characterized by the fluidity of the attribute that unites its single elements. It is based on dim, unreal and unstable characteristics.

5. A pseudocomplex is often taken to be a real concept. For example, a child may group together all triangles. It looks as if the child is grouping according to a concept of a triangle, when actually the child is being guided by the concrete, perceptual likenesses of the objects. In this way the results might be the same as when a child used true conceptual thinking, but the process by which they are reached may not be the same.

Finally, in a last stage, the child develops the ability to think conceptually, a process which requires more than the establishing of relationships: "it is also necessary to abstract, to single out elements, and to view the abstracted elements apart from the totality of the concrete experience in which theyare embedded." It is only when the abstracted traits are synthesized anew and that synthesis becomes the main instrument of thought that conceptualization has been achieved.

Vigotsky's description of the development of conceptual thought is one of the most penetrating and comprehensive works of its kind. On the other hand, it is difficult to understand how he reached his conclusions using the methods he described.

Assuming that thinking in complexes implies the use of concrete and perceptual characteristics of objects while thinking conceptually implies the use of more abstract characteristics, it does not follow that there is anything inherently "logical" about the word lag, for example, referring to objects that are tall and large. Certainly the child must learn to single out two characteristics and exclude all other characteristics, but how can one determine whether these traits have been "synthesized anew?" How can this be distinguished from a pseudoconceptualization, based on the two correct perceptual characteristics implied in the name? In this method, the concept is based on perceptual characteristics.

Despite these difficulties, the concept of pseudoconcepts is doubtlessly an important one in the development of thought. It is unfortunate that no researchers have attempted to apply Vigotsky's methods and theoretical analysis to schizophrenic children.

Reichard, Schneider and Rapaport (1944) also experimentally studied the development of concept formation in normal children. Using the Color-Form and Sorting tests described by Goldstein and Scheerer (1945), they tested 234 children ranging in age from four to fourteen. The Color-Form test consists of twelve pieces of cardboard of four different colors and three different

shapes. The child is asked to "put them together in another way, in a different way." He is then asked to verbalize the basis for his groupings. Success is measured as the ability to shift from one grouping to another.

The Sorting test consists of thirty-three small, familiar objects. In the first part of the test, the children are given seven objects, one at a time; and for each object, they are asked to define the basis for their groupings. In the second part of the test the children are given twelve groupings, based on various characteristics, which they are asked to define.

On the Color-Form test, Reichard found that before five years of age, the children could not shift from one grouping principle to another. Around seven or eight years of age, the ability to shift from one grouping to another became predominant; and after eight, over 75% of the children were able to form both groupings.

Following Rapaport (1970), Reichard et al. distinguished three stages of concept development. The first stage, or concrete stage, was seen primarily in children under five years of age. In the second stage, the children predominantly used functional concepts, and this stage peaked around eight or nine years of age. In the third stage, which peaked around age eleven, the children used mature conceptual definitions. They

also found that children were able to perform the task earlier than they could verbalize the rationale for their classification.

In the first part of the Sorting test (where the child is required to form his own grouping), Reichard found "a rather steady increase, both in the number of correct responses and of conceptual definitions." On the second part of the test (where the child is asked to define the basis for an already formed group), the increase was less regular. Also, in the first part of the Sorting test, the percentage of conceptual definitions did not exceed the percentage of functional definitions until the age of nine. In the second part of the test, conceptual definitions outnumbered functional definitions at all age levels. The percentage of correct responses, however, was much higher on the first part of the test at all ages.

It is possible that the discrepancy between the number of conceptual definitions given in the first and second parts of the test may be due to what Vigotsky calls pseudoconcepts. That is, it is possible that the children may have used a word, which to them only described the physical characteristics of one or more of the objects in the grouping, but which also happened to be the label for the concept. On this part of the task, the concepts were often wrong, although they were also very numerous. It is difficult to group dissimilar objects on the basis of shared perceptual characteristics, while it is

easier to give a conceptual name to familiar objects, even though the actual concept may not be understood.

Reichard's findings--that conceptual thought exceeds functional thought after nine years of age, and is present even earlier--seems to contradict Vigotsky's conclusion that conceptual thinking does not occur until adolescence. Also, Reichard's results indicate a more gradual development of conceptual thinking than Vigotsky seems to show.

Irving Schulman (1953) studied concept formation in ten hospitalized schizophrenic children, ranging in age from seven to fourteen. The diagnosis of schizophrenia was based on the following criteria: "transitory hallucinations or delusions, blandness and inappropriate affect, withdrawal syndromes, 'sticky' unemotional clinging to people, and bizarre or inappropriate behavior." Schulman wanted to test the hypothesis that schizophrenia is due to defective ego development, and he used as his measure of ego development the Sorting test as described by Goldstein and Scheerer. Schulman added, however, several other scoring categories for "pathological verbalizations." These categories included:

1. Syncretistic responses: broad overgeneralizations.
2. Fabulated responses: the creation of a story or plot through the continuous inclusion of additional objects to a sorting.

3. Symbolic responses: the utilization of objects for arbitrary sumbolic interpretation.

4. Chain responses: the grouping according to one quality and adding objects according to various additional qualities of the grouped objects.

5. Split-narrow responses: a grouping divided into one or more groups, and each one defined.

Schulman, comparing his results with those obtained by Reichard, finds that the schizophrenic children show almost a complete absence of conceptual definitions, very few functional concepts, and a "tendency towards formation of concrete concepts in excess of functional and abstract concepts." Schulman also finds "evidence of pathological verbalizations and a lack of evidence of any developmental trends in relation to the age of the schizophrenic children." Although Reichard does not say so specifically, one can infer that she found no evidence of such pathological verbalizations.

Schulman concludes that "the impaired ego in schizophrenic children prevents their adequately understanding the relationship of environmental objects."

Gloria Friedman (1961), in perhaps the most comprehensive and well-controlled study of conceptual thinking in childhood schizophrenia, analyzed twenty schizophrenic boys and twenty non-schizophrenic boys between the ages of eight and eleven years. The diagnosis in each case was based on "a severe functional personality disturbance with manifestations in

distorted interpersonal relationships, inappropriate and bizarre behavior, self-preoccupations and impaired reality testing." In both groups the children were of normal intelligence.

Friedman used the Color-Form Sorting test and the Object Sorting Test described by Reichard, as well as two similarities tests. Friedman also designated several categories for pathological responses: syncretistic thinking, fabulated thinking, symbolic thinking, chain responses, and autistic responses.

In general, Friedman finds that schizophrenic children do give abstract and functional responses. However, they are unable to use these modes of thinking consistently and to the same extent as the normal children. What is outstanding is the way in which the schizophrenic children handle difficult conceptual tasks: "Far outdistancing the non-schizophrenic group in this area, the schizophrenics gave personalized and autistic responses and showed a significantly greater tendency to overgeneralize and give vague, all-inclusive responses, as well as to restrict markedly their conceptual experiences." In contrast, the non-schizophrenics were able to think more conceptually and show no personalized or peculiar associations, although overgeneralizations and occasional fabulations were sometimes given.

Friedman suggests that the mode of thinking in schizophrenic children is <u>not</u> a regressive or immature one. The schizophrenic

children, even when they made errors, showed a complexity of thought not typical of the younger child. Also, they evidenced areas of adequate abstractive abilities for their ages. She concludes: "The data, instead, are more suggestive of a disturbance in the organizing and integrative functions of the schizophrenic child, which makes him less able to cope with the more complex, conceptual material, as well as less able to learn and profit from instruction."

While Schulman finds almost a complete absence of conceptual and functional responses, Friedman finds that schizophrenic children do give abstract and functional responses, even though they are not able to use them as consistently or extensively as normal children. One possible reason for this discrepancy is that Friedman controlled for intelligence, while Schulman did not. Many children who are severely retarded are misdiagnosed as psychotic. As Anthony (1958) has pointed out, "about 25% of psychotic children as well as 25% of defective children have an I.Q. worse than 50." It is possible that some of Schulman's subjects were retarded, and as such would not be expected to give abstract responses, schizophrenic or not.

Both Schulman's and Friedman's groups give evidence of pathological verbalizations. Finally, Schulman's and Friedman's results also suggest that thought in schizophrenic children is not a regression, but a disorganization. What Schulman terms an "impaired ego," Friedman calls a "disturbance in the organizing

and integrative functions." Whichever term is used, it is not the concreteness of the child's thought alone which characterizes it as schizophrenic, but rather the manner in which he approaches the task embodied in concept formation.

3. Piaget

To summarize Piaget's findings pertinent for the objectives of this research, it is necessary to distinguish several main characteristics of Piaget's point of view. Piaget's point of departure is an epistemological one. His epistemological framework is grounded in Kant's (1956) concepts of two contrasting types of intelligence: the intellectus ictypus and the intellectus archetypus.

The intellectus ictypus derives its information from the sensory intuition of things. This type of intelligence has a guaranteed relationship to objects. The intellectus archetypus has no such guaranteed relationship to objects. In this type of intelligence, thinking itself brings objects into existence in the same way in which the "ideas" in the divine mind are archetypes of things. Intellectus archetypus refers to categories or concepts of a higher order than simple empirical concepts. They have to do with the context of our experience, rather than its matter.

Perhaps the most essential concept in Piaget's theory of cognitive development is the concept of structure. Piaget has devoted a great deal of his professional efforts to the delineation, both theoretically and experimentally, of intellectual structures. Piaget (1970) defines a structure as "a totality; that is, it is a system governed by laws that apply to the system as such, and not only to one or another element in the system."

Flavell (1963) contrasts structure with the content and

function of intelligence. For Piaget, the function of intelligence is always the adaptation of the individual to reality. The content of intelligence is the observable behavior. The structure of intelligence is, in a sense, the mediator between the function and content of intelligence. It is an explanatory concept, with which we can understand why one particular content and not another was chosen. This is why structures are so important to Piaget's theory. As Furth (1969) states:

> In order to explain a response in any relatively complete way, one must investigate the underlying structure that makes that response possible and adaptively appropriate. (Italics mine.) (p. 13)

Without an analysis of underlying structure, we are left with either the raw data (which soon becomes overwhelming and often is unintelligible by itself) or with interpretations (which, though fine for learning theories, are insufficient for developmental theories).

I.Q. tests provide only raw data. Perhaps this is one reason why they have been of so little value in elucidating schizophrenic thought. Traditional learning theories provide only interpretations--they, too, have proven insufficient for understanding schizophrenic thought processes. It is only through an understanding of how thinking is normally organized--or structured--that we can begin to understand deviations from the norm. The same questions must be asked about schizophrenic

thought in childhood: how are these responses possible, and in what ways are they adaptively appropriate?

For Piaget, every instance of cognitive functioning presupposes three things: organization (or structure), assimilation and accommodation. These are the "functional invariants." The concepts of assimilation and accommodation are necessary for the understanding of the process of development--the means by which structures develop and change.

Assimilation is the term that Piaget uses to describe the "taking in" of environmental data. This is not a simple, mechanistic process, however, as, say, a camera might take in a view. For an external event to be assimilated, it must be in some way "familiar" to the organism:

> ...reality data are treated or modified in such a way as to become incorporated into the structure of the subject. In other words, every newly-established connection is integrated into an existing schematism. (Piaget, 1930, p. 5)

Thus, assimilation is not a passive process, but rather a process of restructuring the environment to make it fit into an existing structure.

Accommodation is the "simultaneous and dissociable" counterpart to assimilation. While assimilation implies a certain restructuring or reorganizing of reality, reality--by its very nature--requires that the structures themselves change to fit its demands. Accommodation is thus the "tendency of

the inner structure to adapt itself to a particular environmental event" (Furth, 1969).

In this way cognitive development progresses. Accommodation implies a change in structure, and a change in structure allows for a greater range of assimilations. It is the interplay of assimilation and accommodation that provides the dynamic force of development. As Furth states:

> ... knowledge is neither solely in the subject, nor in the object, but is constructed by the subject as an indissoluable subject-object relation. (p. 19)

Although the functions of assimilation and accommodation remain invariant throughout development, the role each plays during the development changes. The interaction of these two invariants provides a measure of progressive equilibration--which, for Piaget, is the main organizing developmental principle: the individual develops through periods of greater and lesser equilibrium.

Piaget asserts, however, that there are periods of equilibration, qualitatively different enough to be called stages. These stages are (1) sensory-motor, (2) preoperational, (3) concrete operational, and (4) formal operational. Stages have essentially three properties:

(1) They must emerge in development in an unchanging and constant order.

(2) Structures defining earlier stages become integrated or incorporated into those of the stages following.

(3) Structural properties which define a given stage must form a whole.

For Piaget, the concept of an invariant sequence of stages is both empirically true and logically necessary; that is, if previous structures become integrated into later ones, then a later stage cannot logically develop before an earlier one.

The subjects in the present study are at the age (from eight to ten years old) when most children have reached the concrete operational period of development. Before describing the Piagetian research that has been applied to schizophrenic children, I will briefly describe the preoperational and concrete operational periods in normal development.

The transition from sensory-motor intelligence to pre-operational intelligence is a rather large step in human development. It represents the transition from actions to an inner, symbolic representation of a reality. (The preoperational period is considered to be roughly between the ages of two and seven.) The child is able to differentiate, for the first time, between signifiers (e.g., words) and significates (meanings). Further, Piaget (1969) contends that while this step is aided by the development of language, language does not in itself give rise to the symbolic function.

The best way to describe the various characteristics of preoperational thought is with an example. One of Piaget's most familiar experiments deals with the development of conservation of quantity (Piaget, 1965). (This experiment is described more fully in Appendix B.) In this experiment, the child is presented with two balls of clay or plastic of approximately the same size and shape. The child is asked to affirm their equality. Then one of the balls is transformed in various ways: into a long sausage shape, into a flat, pie-shape, and finally it is broken into several pieces. All of this is performed in full view of the child. At each transformation, the child is asked whether the two pieces of clay are still equal.

The preoperational child will answer that the two clay balls are unequal when their perceptual characteristics are transformed. He may, for example, say that the piece that has been rolled into a sausage is longer. What he does not (or is unable to) take into account is the fact that the sausage, while longer, is also **thinner.** In other words, the preoperational child (1) centers on only one aspect of the situation, to the exclusion of others.

Also, the child (2) only focuses on particular, isolated moments of the situation; that is, he pays no attention to the transitions. In the above example, the child focused on only those moments when the balls of clay were being compared. He

was unable to use or attend to the transformation itself, which only rearranged and did not change the quantities.

One reason that the child cannot use the transformation is that he (3) lacks reversibility. That is, when the transformed object is in front of him, the child cannot mentally reverse the process and arrive at the original point of departure. When the clay has been transformed into a sausage, the preoperational child cannot mentally reverse the process.

A related feature of preoperational thought is (4) realism. To the preoperational child, things are what they seem. If, when the two balls of clay are compared, one of them looks larger than the other, then it is larger. From another perspective, it can be said that the preoperational child (5) lacks logical necessity. He doesn't comprehend that if nothing is added and nothing is taken away, then the piece of clay must be the same. Thus, the preoperational child is undaunted by what adults consider inconsistencies and contradictions. He feels no compulsion to be either logical or consistent.

Finally, preoperational thought is characterized by (6) egocentrism. The preoperational child, both literally and figuratively, is unable to take another person's perspective.

The concrete operational child, on the other hand, would have responded to the above task by affirming the equality of the two balls of clay whatever the transformation. This seems

like a simple enough difference; however, the implications are vast.

The most obvious implication is that the child has achieved conservation; that is, he now maintains that the object remains the same, even though its perceptual characteristics are changed. (It is important to note that not all conservations are achieved at the same time. Piaget (1969) has found that conservation of substance is achieved at about 7 or 8 years, conservation of weight at about 9 or 10 years, and conservation of volume at about 11 or 12 years.) However, it is not simply that the child has recognized this property of the object, but rather that he now has a structure or internal system which can compensate internally for the external changes made on the object.

This internal system implies reversibility--what Flavell terms "the core property of cognition-in-a-system." Reversibility is the ability to perform an action in a reversed direction. In the example cited, it is the ability to internally reverse the process of rolling the clay into a sausage. Reversibility may be expressed as an inversion or a reciprocity. An example of reversibility by inversion would be the child's response: "They're equal, because if you put the clay back into a ball, they would be the same again." An example of reversibility by reciprocity would be: "They're the same, because even though this one's longer, it's also thinner." It is principally this criterion

of reversibility that distinguishes the preoperational from the concrete operational child.

Piaget (1969) describes the transformation from pre-operational to concrete operational thought in this way:

> ... representative intelligence...arrives at a decentering based on the general coordination of action, and this permits the formation of operatory systems of transformations and constants or conservations which liberate the representation of reality from its deceptive figurative appearances. (p. 129)

An operation, then, is any representational act which is an integral part of an organized network of related acts. Piaget distinguishes logical and infralogical operations. A logical operation deals with logical classes and relations, while infralogical operations involve quantity, measurement, time and space.

The concrete operational child, in his response to the example of conservation of matter, is behaving quite differently from the preoperational child. He is able to center on more than one aspect of the situation; he is able to pay attention to the transformations. The concrete operational child is characterized by the ability to internally reverse appropriate actions. The concrete operational child is less egocentric than the preoperational child, and does not judge by perceptual appearances alone. The concrete operational child asserts the logical necessity of his responses.

For the concrete operational child, the transformation of a ball of clay into the shape of a sausage is not a single isolated event, as it is for the preoperational child. Rather, it is only one instance in a total system of possible transformations, each one reversible. This is a very important point in Piagetian theory. Once the child has achieved the operatory level, any transformation of the clay, however gross, will still result in the same result: conservation of equality. It is the internal structure which now guides the intellectual process, rather than the specific attributes of the object.

However, the concrete operational child is still primarily dealing with the real, as opposed to the possible. It is not until the level of formal operations, usually achieved in early adolescence, that the child orients his thinking more towards the hypothetical.

As mentioned above, the subjects in the present study should age-wise have reached the concrete operational period of development. I will now review those authors who have applied Piagetian concepts to the study of schizophrenic children of approximately this age level.

Esther Halpern (1966) describes the conceptual development of a schizophrenic boy over a period of ten years. She assesses conceptual development using standardized Piagetian tests, as well as traditional I.Q. tests. Halpern cites Goldfarb (1961),

who found schizophrenic children inferior to normal children in perception and abstract thinking, and addresses herself to the developmental aspects of this conceptual inferiority.

Specifically, the schizophrenic boy was given four traditional I.Q. tests over a period of ten years: from the time he was five until he was almost fifteen. His scores are as follows:

Year	Age	I.Q.
1954	5 years	2-5 years (incomplete)
1957	7-10	87
1963	13-7	V=111 P=73 FS=92
1964	14-6	V=114 P=74 FS=94

In 1963 and 1964 Halpern also administered a series of Piagetian tasks. These tests, standardized by Pinard and Laurendeau (1962), assess the development of physical causality as measured by three questionnaires: (1) the concept of dream, (2) the concept of life, and (3) the concept of the origin of night. Halpern also assessed the development of conservation and transivity of weight (Halpern, 1965).

Halpern found no differences between the two administrations of the Piagetian tasks. On the concept of dream and origin of night questionnaires, the schizophrenic boy achieved at the concrete operational level of thought. In contrast, he exhibited

precausal, animistic thinking on the concept of life task. Also, he succeeded in reaching the concrete operational period of thought on the conservation of weight tasks, but he did not reach this level on the transivity of weight tasks.

Halpern points out the limitations of traditional tests of intelligence for measuring the development of cognitive functions--especially in schizophrenic children. Aside from the wide discrepancy between verbal and performance subtests (which Halpern did not interpret), the Wechsler scores tell us little about the cognitive functioning of the schizophrenic child. The Piagetian tasks, on the other hand, point to a marked retardation in two areas of functioning: the concept of life and transivity of weight.

Halpern does not theorize about the meaning of her findings in terms of the cognitive development of the child she is studying. Rather she simply points to the advantage of using a Piagetian approach in studying schizophrenic thought: "a lacuna in cognitive functioning is detected in terms of the on-going process of cognitive development, and not only at a cross-age comparative level."

Lerner, Bie and Lehrer (1972) address themselves to the question of why many hospitalized mentally-ill adolescents and young adults are unable to learn complex mathematical operations. To test this hypothesis, they administered three of Piaget's tests of conservation: amount, weight, and volume.

The subjects were 35 patients, ranging in age from 15 to 23 years, all of whom were hospitalized for severe emotional illness. Their I.Q.'s ranged from 50 to 118, with 14 scores below 80. The subjects were given the arithmetic section of the Wide Range Achievement Test (Jastak and Jastak, 1965), and the three conservation tests described by Inhelder (1968).

Lerner et al. found that no subject who gave a concrete-operational response to the volume task gave a preoperational response to the conservation of amount of the conservation of weight tasks. These results are consistent with Piaget's assertion that conservation of amount and weight are prerequisites for conservation of volume.

However, of the 21 subjects who had I.Q.'s higher than 80, 19 gave concrete operational responses to the amount and weight tasks, while 11 gave concrete operational responses to the volume task. Those subjects with I.Q.'s less than 80 failed to show concrete operational thought.

Finally, subjects who showed preoperational thought on tasks of amount and weight (that is, generally those subjects with I.Q.'s less than 80) were unable to attain WRAT scores above the seventh grade.

Obviously, I.Q. is a confounding variable in this study. Lerner et al. conclude that "the level of achievement [on the WRAT] is closely linked to the mastery of the conservation problem."

However, their finding that almost 50% of their subjects with normal I.Q.'s gave preoperational responses to the conservation of volume task--generally achieved by early adolescence--cannot be explained by the subjects' intellectual level. Lerner cites Trunnel's (1964, 1965) observation that schizophrenics do less well than normal subjects on Piaget's cognition tasks.

As in the previous study, the authors make no attempt to integrate their results into either a theory of cognition or a theory of mental illness. Though the results obtained by a Piagetian analysis yielded more information than simply an I.Q. score, there is no attempt to "make sense" of these results beyond the general observation that schizophrenics do not do "as well" on certain Piagetian tasks as normals. In other words, the authors treat the Piagetian tasks as I.Q. items: they analyze the results in terms of success or failure, rather than assessing the structure of parts within a whole.

E. James Anthony, in a paper first published in 1957 and later expanded and published in 1958, approaches the problem of psychosis in childhood from a more theoretical point of view than the previous papers. And, while Anthony's theoretical stance is not strictly Piagetian, he uses Piagetian concepts to experimentally confirm and elucidate his own views.

Anthony's stated purpose is to attack "a conception of childhood psychosis as a bizarre, atavistic condition that

transforms the afflicted person into some kind of psychological monstrosity." In order to link childhood psychosis with other forms of normal and abnormal development, Anthony focuses his inquiry on the symptom of autism as a diagnostic criterion. He considered autism a charactersitic which occurs in varying degrees in both normal and abnormal development. It is found in its most extreme forms in psychosis, and its components are: (1) an inability to form human relationships (a-cathexis), (2) an inability to differentiate self from non-self, internal from external, subject from object (a-dualism), and (3) the lack of development of certain psychological functions necessary for communication and expression (a-genesis).

Anthony divides the psychoses of childhood into two distinct groups--primary and secondary--based on the vicissitudes of the symptom of autism. In the primary group, the child never, or at most only slowly develops from the normal autistic phase of childhood. In this group, Anthony includes the autistic children described by Kanner and Mahler. In the secondary group of psychotic children are those who have experienced a seemingly normal period of development, but then regress to a state of autistic withdrawal. Included in this group are the children described by Bender as pseudoneurotic and by Mahler as symbiotic psychoses.

In explaining his theoretical position, Anthony employs the barrier hypothesis as described by Bergman and Escalona (1949).

He hypothesizes that in primary autistic children the constitutional barrier is unusually thick; that is, it is difficult for stimuli to get through. This condition, however, is insufficient to bring about psychosis. Anthony believes that in addition, the environment (generally the mother or mothering figure) must also be unstimulating, thus resulting in the failure of the child to emerge from his autistic state. In cases of secondary autism, the reverse is true. The child has an uncommonly "thin" protective barrier, and in addition, the environment is overstimulating. The result is a regression or withdrawal back to the autistic state.

In testing the usefulness of this theoretical division, Anthony investigated the object concept of the psychotic child. Based on Piaget's description of the development of the object concept, Anthony devised a scale representing complete, incomplete, and absent notions of a particular object concept--a hierarchical analysis. Each child was given an "organismic age" derived from chronological age, mental age, social age, and bone age. This organismic age was plotted against the ages indicated by the levels of test behavior.

Anthony's findings are two-fold:

(1) When the group was treated as a whole, object behavior followed cognitively (but not cathectically) the reactions of the normal infant. The correlation was $r = .24$.

(2) However, when the group is split into primary and secondary cases, the correlation of primary cases to normal development increases ($r = .64$), while the correlation of secondary cases to normal development decreases ($r = .19$). Anthony concludes: "It would seem therefore that the forward development of the primary children coincides with the forward development of normal children, whereas the backward development of the secondary child is much more a perversion of human behavior."

In a second investigation into the egocentricity of the psychotic child, another component of autism, Anthony uses Piaget's Test of Three Mountains (Piaget, 1929). In this task the child sits at a table upon which is a series of toy mountains of various heights and configurations. A toy child is placed at the top of one of them, taking a picture of what he sees in front of him. The subject is given a series of photographs and asked to choose which position they were taken from. In other words, the subject is asked to put himself in another person's place. Piaget found that children below seven years of age could not do this, and he termed this inability "egocentricity."

Because of the relationship between egocentricity and autism, Anthony predicted that psychotic children would be more egocentric in their responses than a control group of neurotic children. He took 15 psychotic children from eight to twelve years of age, with I.Q.'s ranging from 70 to 90 and matched

them for age and I.Q. with 15 neurotic children. He found that 65% of the psychotic children gave egocentric responses, while only 13% of the neurotic children did. (In this age group, normal children would be expected to give no egocentric responses at all.)

Without specifically addressing himself to the issue of regression versus disorganization in childhood psychosis, Anthony makes his position quite clear. He defines his group of secondary autism in terms of regression, after a period of normal development, to a lower level of functioning. In terms of the development of the object concept specifically, he asserts that secondary cases "slide backward down the hierarchical scale of objects from structured to unstructured, until it eventually reaches a level at which things lose all meaning except as part of some primitive sensory-motor patterning." However, he bases this assertion, at least in part, on the correlation of primary cases with normal development of .64 and the correlation of secondary cases with normal development of .19. The correlation of .19 indicates a lack of correspondence or relationship between secondary and normal development, but it does not necessarily imply a regression. It could also be accounted for by a theory of disorganization.

Bertha Mook's (1972) study of causal thought in schizophrenic children is the only study to date that combines a

careful application of Piagetian methods with a rigorous analysis in terms of Piagetian theory. She eloquently speaks to what is perhaps the most important aspect of a Piagetian approach to the study of thought in childhood schizophrenia:

> His frame of reference further provides the opportunity of viewing pathology of thought as an abnormality of 'system-connections.' This transcends the usual descriptions in terms of theoretical or empirically assessed relationships as it takes into account the organization of parts within a whole. (Italics mine.) (p. 21)

Mook chose to study the development of causal thought in schizophrenic children. She used five questionnaires based on Piaget's work (Piaget, 1929; 1930), and standardized by Laurendeau and Pinard on five hundred Montreal children between the ages of four and twelve. Laurendeau and Pinard divided the realm of pre-causality into five areas: realism, animism, artificialism, dynamism and the understanding of physical laws. Mook chose one questionnaire to evaluate each of these five areas.

(1) The Concept of Dream taps the presence of realism in the child's thought. In this use of the term, realism implies a lack of discrimination between different levels of reality--between internal and external, subjective and objective.

(2) The Concept of Life explores the child's animism; or, in other words, his tendency to endow all objects with human consciousness and feelings.

(3) The Origin of Night deals with the pervasiveness of artificialism--the belief that everything is caused by human action.

(4) The Movement of Clouds explores the dynamism of the child. This is his tendency to endow the animistic world with energies and forces enabling objects to move themselves.

(5) Finally, Floating and Sinking of Objects explores the child's understanding of elementary physical laws. (This is the only task that involves the actual physical manipulation of test materials by the child.)

Piaget found that the normal child follows a specific sequence of developmental stages in the development of these concepts. Laurendeau and Pinard, confirming the main assumptions of Piaget's work, devised age-norms for these stages.

Mook studied twenty schizophrenic children between the ages of eight and ten, of normal intelligence, and living in various psychiatric and non-psychiatric settings. She compared these children to 45 normal children of the same age (fifteen children of each age) and 20 normal children six years of age. Her findings of normal children were consistent with the Montreal data, and on this basis, she felt justified in applying the age-scale derived from their data.

Mook finds that, from a structural and logical point of view, schizophrenic children fall into the preoperational

stage of cognitive development. When compared with normal controls, she found that the scores obtained by schizophrenic children were more comparable to the scores obtained by normal six-year-olds than by normal children of the same age. However, the schizophrenics showed more variability across stage levels than either the younger or same-aged controls. In addition, Mook finds differences in both the total occurrence of modes of precausality used by the schizophrenic children and in the overall patterns of precausality. Also, the schizophrenic children's protocols contain evidence of thought disorders such as autistic, chain and contaminated responses.

Mook interprets her findings as indicative of an organizational disorder, due to a lack of synthesis between the mechanisms of assimilation and accommodation. When assimilation predominates, the child's thinking is characterized by animism, dynamism, and artificialism. When accommodation predominates, the child's thought is determined by the immediate perceptual realities of the given situation. Mook's conclusions with respect to the issue of regression versus disorganization of thought are important for a Piagetian analysis:

> From a structural point of view it can thus be said that the schizophrenic children showed an atypical development pattern as they did not progress normally through the ontogenetic stages. Their development can be conceived of a simultaneously reflecting regression to the lowest levels, fixation

> at some transitional stages, retardation in terms of lower mean stage-level functioning, and prematurity in the sense that they proceeded to higher levels while previous stages had not been adequately mastered...The schizophrenic children failed to achieve structural integration at any stage-level of causal thought development. (Italics mine.) (p. 58)

It could be said that research applying Piagetian concepts to the study of thought in childhood schizophrenia is still in the preoperational period. Too often researchers administer Piagetian tasks, but treat them as isolated events, with no attempt to integrate their findings into Piaget's overall theoretical system. Perhaps the most important area that needs to be investigated further is the organization of schizophrenic thought in children, described in terms of Piagetian theory.

Mook's study is the most comprehensive application of Piagetian theory to childhood psychosis to date. Of particular interest is her finding that the schizophrenic children "did not progress normally through the ontogenetic stages." If her results can be replicated and extended to other areas of thought in the schizophrenic child, then not only our knowledge of schizophrenic thought, but also of Piagetian theory will be extended.

Hypotheses

The review of the literature which has approached the study of thought in childhood schizophrenia within the framework

of thought disorder and conceptual thinking led naturally to the Piagetian theoretical framework. The analysis of this framework, with particular reference to the issue of the structure of thought in schizophrenic children as a disorganization versus a regression of thought, leads me to the specific hypotheses that were examined in my research.

Hypothesis I. Eight to ten year-old schizophrenic children, who age-wise should be at the concrete operational level, will primarily function within the preoperational or transitional level of thought.

The age at which various concepts are attained can be affected by intellectual potential, educational exposure and cultural differences. Thus, in this research I will compare the sequence of achievement of concrete operations with the sequence obtained by Piaget (Voyat, in press):

(1) one-to-one correspondence

(2) seriation

(3) conservation of matter

(4) conservation of length

(5) class inclusion

Hypothesis II. Schizophrenic children will not follow the sequence of achievement of concrete operations that Piaget found with normal children.

CHAPTER II

EXPERIMENTAL DESIGN

The research method chosen for this study is a compromise between a statistically analyzed experiment and a clinical case study. It was possible to make certain predictions regarding our results based on previous work in this area--notably Mook (1972). These hypotheses (I and II) are analyzed by the appropriate statistical methods.

However, the essential thrust of this work is observational, descriptive, and analytical. Thought in schizophrenic children, from any viewpoint, is still basically an uncharted territory, and it is the purpose of this study to provide the framework for a structural analysis of schizophrenic thought processes. As Piaget (1929) has pointed out:

> ...the detailed study of the contents (of the child's thought) reveals to us those questions which the child is revolving in his own mind and which might never have occurred to us, or which we should never have framed in such terms. (p. 4)

In order to explore in detail the contents of thought in schizophrenic children, a qualitative analysis of their protocols was also carried out. It is through this method that it is possible to analyze the relationship between the structure and content of thought in schizophrenic children.

Subjects

The subjects in this study were ten male hospitalized inpatients at the New York State Psychiatric Institute. They

were chosen according to the following criteria:

1. Between the ages of eight and ten years, inclusive

2. Diagnosed as schizophrenic according to Bender's criteria for pseudo-neurotic schizophrenia (see page 5), with the following additional criteria used by the staff of the Children's Service:
   a. speech not always used for communication
   b. perseverative behavior
   c. poor object relations

3. Of average intelligence: an I.Q. of 90 or above on the Verbal or Performance (or both) sections of the WISC

The ages between eight and ten years were chosen because this age range encompasses the period of concrete operational thinking in the normal child.

The diagnosis of childhood schizophrenia is still controversial, and there is no one method of diagnosis or system of classification that has emerged as preferred. In an attempt to control for the heterogeneity of diagnoses, all the children in this study were obtained from a single institution--the New York State Psychiatric Institute. The Director of the Children's Service, Dr. Mary MacKay, supervised the diagnosis of each of these children. She, in turn, acknowledges her debt in particular to Lauretta Bender for her diagnostic criteria for schizophrenic children.

In addition, all of the children were tested by Ms. Ruth Montgomery, the psychologist of the Children's Service. See Appendix A for a complete list of the subjects' ages and I.Q.'s.

Method

Each child was presented, in random order, the following five Piagetian tasks: one-to-one correspondence, seriation, conservation of matter, conservation of length, and class inclusion. The experimenter, of course, had no prior knowledge of the subject's history or intelligence level.

The testing situation was structured around a specified set of questions (see Appendix B); however, none of the children were presented with exactly the same questions in exactly the same way.

This is an essential aspect of what is called the clinical method. In this method, the child is presented with a given task, and he in turn makes some kind of response. The experimenter then asks the child a question--based in part on the child's response. For example, in the present study, if the child seemed somewhat unsure of his response, a counter-suggestion was often given. (A counter-suggestion presents the child with a contradiction. The experimenter says that another child said something quite different from the subject, and asks the subject who he thinks is correct. Or, the experimenter may present the child with a contradiction in his own responses: "But just a minute ago you said ....") The purpose of a counter-suggestion is to see how sure the child is of his own response, and whether he is willing to change his response in the face of a contradictory suggestion.

Sometimes the child's responses were probed more deeply; at other times, the child was allowed to take the lead and ask questions. The purpose of this approach is two-fold. First, it allows the child the freedom to go where his thoughts lead him. Second, it can clarify for the examiner what lies beneath the child's response and provide additional insight into the child's cognitive structure.

The advantages of this method in elucidating the thought processes of the schizophrenic child far outweigh its disadvantages. The primary disadvantage of this method is that its success depends upon the sensitivity and alertness of the examiner to the nuances of the child's behavior and responses. Given a sensitive examiner, however, the clinical method allows for an examination of thought processes, as opposed to answers.

Depending upon the emotional state of the subject, the tasks were administered in at least two and often three or more sessions. If the child seemed unwilling or disinterested, the testing was discontinued and the task was re-administered at a later time.

The child's responses were tape-recorded and then transcribed by the author. The responses were rated by the author and two other doctoral candidates in clinical psychology, both familiar with Piagetian theory. The criteria they used are described in Appendix C.

Piagetian Data

The concrete operational level of thought is reached at age seven or eight (Piaget, 1969). Studies on children in the United States, in fact, have shown that American children, on the whole, tend to achieve concrete operations at a slightly earlier age (Cole, Gay, and Sharp, 1971). Thus, one can assume that normal American children between the ages of eight and ten will be at the concrete operational level of thought.

Normal cognitive development passes through an invariant sequence of stages: sensori-motor, preoperational, concrete operational and formal operations. This fact has been validated by numerous cross-cultural research, although certain cultures never reach the level of formal operations (Berry and Dasen, 1974). Since only a longitudinal study could assess the concept of invariant sequence of stages, for the purpose of this study, I will compare the order of achievement of each task with the order of achievement observed by Piaget. This approach obviates the need for specific age comparisons, as it is the order of achievement that is evaluated, rather than the age of achievement.

Table 1 presents the percentage of subjects achieving concrete operations on each of the five tasks from five to nine years of age (Voyat, in press). Achievement on a task is reached when 75% of the subjects reach the level of concrete operations (Nassefat, 1963).

Table 1

Percentage of Achievement of Concrete Operations*

	Age				
Task	5	6	7	8	9
One-to-One	.50	.75	.80		
Seriation	.09	.34	.63	.95	
Conservation of Matter	.16	.16	.32	.72	.84
Conservation of Length	.08	.11	.20	.68	.96
Class Inclusion	.16	.26	.46	.63	.73

*Voyat, G. Piaget Systematized. New York: Teachers College Press 1976, in press.

Analysis of the Data

Hypothesis I states that eight to ten year-old schizophrenic children, who age-wise should be at the concrete operational level, will primarily function within the preoperational or transitional level of thought. The null form of Hypothesis I is as follows:

> The majority of schizophrenic children between eight and ten years of age will perform at the concrete operational level of thought, their age-appropriate level.

To evaluate this hypothesis, each task was first assigned a stage level based on the agreement of at least two of the three judges. The preoperational stage was assigned a value of 1, the transitional stage was assigned a value of 2, and the concrete operational stage was assigned a value of 3. The arithmetic average of each of the five tasks was then computed to determine the overall stage of each of the subjects.

Hypothesis II states that schizophrenic children will not follow the sequence of achievement of concrete operations found by Piaget: (1) one-to-one correspondence, (2) seriation, (3) conservation of matter, (4) conservation of length, and (5) class inclusion. The null form of Hypothesis II is as follows:

> In schizophrenic children, the order of achievement of concrete operations will be the same as observed by Piaget: (1) one-to-one correspondence, (2) seriation, (3) conservation of matter, (4) conservation of length, and (5) class inclusion.

In order to evaluate Hypothesis II, the Guttman scalogram analysis was used (Anderson, 1966). A Guttman scalogram measures the degree to which obtained data approximates the scalogram model. In a perfect scalogram, a subject's score is composed of the number of items passed in a specific order. It assumes that component items are ordered by degree of difficulty. In other words, subjects who achieve a difficult item would be expected to have achieved a less difficult item.

In the present study, each task was assigned a value of 1 or 0, depending upon whether the child was judged as achieving at the concrete operational level on that task (1) or not (0). An example of a perfect scalogram structure is as follows:

	Task				
	1	2	3	4	5
#1	1	1	1	1	1
#2	1	1	1	1	0
#3	1	1	1	0	0
#4	1	1	0	0	0
#5	1	0	0	0	0
#6	0	0	0	0	0

In the above example, Subject #3 would have obtained a score of 3, because he passed itmes 1, 2, and 3, but failed 4 and 5. If, instead, he had passed items 1, 3, and 4, but failed 2 and 5, this would be considered an error, in Guttman's terminology. The fewer errors a set of data has, the more it approximates a

perfect scalogram. Taking into account a certain amount of error of unreliability, a coefficient of reproducibility of .90 or so would be acceptable as an adequate scalogram.

Another feature of this program of scalogram analysis is that it will find scalograms other than the predicted one, if they exist. For example, four items might form a scalogram, but not the fifth. This model will rearrange the items until a scalogram is found and present this scalogram in the results.

The qualitative analysis carried out in this study is a developmental-interactionist one. "Interactionist" in this sense refers to the position that man comes to "know" his environment through an active interaction with it.

As Phillips and Kelly (1975) have pointed out, there are three types of analysis, necessary and sufficient for the developmental-interactionist point of view. These three types of analysis will be carried out in this paper:

1. A structural analysis of the tasks themselves. This will involve an analysis of the underlying structures implied in the acquisition of operational thought in normal children for each of the five tasks employed in this study.

2. A logical analysis of the concepts used to study the phenomena in question. This will involve an analysis of thought in schizophrenic children across tasks. It will provide the conceptual framework with which to describe the structural

laws of internal cognitive organization in schizophrenic children.

3. An analysis of the degree of discrepancy between the child's action system and the experienced event. This will include an analysis of the content of the responses of each child. It is through this third approach that an evaluation of the relationship between the emotional and cognitive realms in schizophrenic children will be possible.

CHAPTER III

RESULTS

Chapter III will include a presentation of the quantitative findings as well the qualitative analysis of the results. The first section will present the results relevant to Hypothesis I and Hypothesis II, which were analyzed by quantitative methods. The second section will present the qualitative analysis of the protocols.

Quantitative Analysis

Hypothesis I states that eight to ten year-old schizophrenic children, who age-wise should be at the concrete operational level, will primarily function within the preoperational or transitional level of thought. The null form of Hypothesis I is as follows:

> The majority of schizophrenic children between eight and ten years of age will perform at the concrete operational level of thought, their age-appropriate level.

To evaluate this hypothesis, each task was first assigned a stage level based on the agreement of at least two of the three judges. Inter-rater reliability as measured by Cohen's kappa (Fleiss, 1973) is presented in Table 2.

Table 3 presents the assigned level of achievement for each subject for each task.

In order to determine the overall stage of each of the subjects, the arithmetic average of each of the five tasks was computed. The overall stage level of each of the ten subjects is presented in Table 4.

Table 2

Inter-Rater Reliability

Task	1 x 2	3 x 2	3 x 1
Conservation of Length	.848**	1.000**	.850**
Conservation of Matter	1.000**	.850**	.850**
One-to-One Correspondence	.350	.580*	.666
Class Inclusion	.552*	.552*	1.000**
Seriation	1.000**	1.000**	1.000**

* $p > .01$

** $p > .001$

Table 3

Level of Achievement for Each Task*

Subject	One-to-One Correspond.	Seriation	Cons. Matter	Cons. Length	Class Incl.	Avg.
# 1	2	1	1	2	2	1.6
# 2	2	1	3	3	3	2.4
# 3	2	3	2	3	3	2.6
# 4	3	2	3	2	2	2.4
# 5	2	1	1	1	2	1.4
# 6	1	1	1	1	1	1.0
# 7	2	1	]	1	1	1.4
# 8	2	2	1	1	2	1.6
# 9	3	3	2	3	3	2.8
#10	3	1	3	3	1	2.2
Avg.	2.2	1.6	1.9	2.0	2.0	

*
1 = preoperational
2 = transitional
3 = concrete operational

Table 4

Average Level of Achievement

for Each Subject

Subject	Average	Stage
# 1	1.6	Transitional
# 2	2.4	Transitional
# 3	2.6	Concrete Operational
# 4	2.4	Transitional
# 5	1.4	Preoperational
# 6	1.0	Preoperational
# 7	1.4	Preoperational
# 8	1.6	Transitional
# 9	2.8	Concrete Operational
#10	2.2	Transitional

Twenty percent of the schizophrenic subjects achieved at the concrete operational level of thought; 80% achieved at either the preoperational (30%) or transitional (50%) level of thought. Thus, the null form of Hypothesis I is rejected. The majority of schizophrenic children in this sample achieved at the preoperational or transitional level of thought.

Hypothesis II states that schizophrenic children will not follow the normal sequence of achievement of concrete operations that Piaget found for normal children: (1) one-to-one correspondence, (2) seriation, (3) conservation of matter, (4) conservation of length, and (5) class inclusion. The null form of Hypothesis II is as follows:

> In schizophrenic children, the order of achievement of concrete operations will be the same as observed by Piaget: (1) one-to-one correspondence, (2) seriation, (3) conservation of matter, (4) conservation of length, and (5) class inclusion.

The data were evaluated by the Guttman scalogram analysis, and there were essentially two findings:

1. The data are not arranged in a scalogram order. That is, if a child succeeded in achieving the class inclusion task, this did not imply that he had also achieved any of the other tasks. A coefficient of reproducibility of .90 would have been accepted as evidence for a scalogram. The obtained coefficient of reproducibility was 0.00.

An analysis of the tasks and age showed no significant age trends.

2. There are no smaller subscales present which even approximate a Guttman scalogram structure. In other words, if the schizophrenic subjects had achieved one-to-one correspondence, seriation and conservation of matter, in that order, such that success on conservation of matter implied success on one-to-one correspondence and seriation, the Guttman scalogram analysis would have demonstrated it.

The implication of these findings is that schizophrenic test performance on each of the five tasks is essentially unrelated to performance on the other tasks. To evaluate this further, Fisher's exact probability test was performed on all possible combinations of tasks (Siegal, 1956). Fisher's exact probability test, designed for small samples, analyzes the hypothesis that two variables have a random relationship. In each combination of tasks, the results of the Fisher test were not significant. In other words, the hypothesis that any two tasks have a random relationship with one another could not be rejected.

Thus, the null form of Hypothesis II can also be rejected. The schizophrenic children in this sample did not achieve concrete operational thought in the same succession of tasks that Piaget found in Genevan children. In addition, no other order was found.

Qualitative Analysis

In Chapter II, the three methods of analysis, necessary and sufficient for a developmental-interactionist analysis were described. They include: (1) a structural analysis of the tasks themselves; (2) an analysis of thought in schizophrenic children by task; and (3) an analysis of thought in schizophrenic children by subject.

1. Structural analysis of the tasks.

The following is an analysis of the concepts underlying each of the five tasks employed in this study. In a sense, it provides the qualitative "normative" data--as well as the theoretical framework--with which to compare and help understand the data obtained from schizophrenic children.

One-to-One-Correspondence. The task of one-to-one correspondence is first to establish such a correspondence between two rows of nine animals each. Then one of the rows is altered (either spread out or pushed together) so that the perceptual correspondence is destroyed. The child is asked whether the two rows are still the same, or whether one is more than the other.

As Piaget (1965) points out, "both counting on the fingers and the exchange of one object for another are indications of the considerable part played by correspondence in the synthesis

of number." However, one-to-one correspondence, in its initial forms, is not adequate to establish true, lasting equivalence of two corresponding sets. That is, a child who is able to establish a correct correspondence will not necessarily maintain the identity of the two sets once the perceptual configuration is changed.

There are three stages in the development of the concept of a lasting equivalence of corresponding sets. In the first stage, the child is unable even to establish a one-to-one correspondence. Generally, he establishes a correspondence between the end-points of the two sets, without regard for correspondences in-between.

In the second stage, the child is able to establish a correct one-to-one correspondence. However, when one set is spread out or the other moved together, the child denies the equivalence of the two rows. That is, the child's thinking becomes dominated by the perceptual--as opposed to the logical--aspects of the situation. The child maintains that the row that looks longer, is longer--even though he will again assert their equivalence when the original correspondence is re-established.

Counting the two rows does not seem to be of much help to the child. As Piaget states, "It is as though, for the child, quantity depended less on number (a notion which...is still only verbal, although the child can count correctly) or on the

one-to-one correspondence between the objects, than on the global appearance of the set, and in particular on the space occupied by it" (Piaget, 1965).

By around seven years of age, the child reaches the third stage, in which he is able not only to establish the correspondence, but to maintain the identity of the two sets irrespective of their perceptual arrangements.

Seriation. The task of seriation is to order ten sticks whose length varies only by a quarter of an inch or so. Obviously, the ability to order objects by size begins at an early age--at the sensori-motor level. One of the first toys children are often given involves putting rings of increasingly smaller sizes onto a peg. However, in this task the differences between the rings are perceptually quite obvious; in the present task the perceptual differences are minimal.

Again, Piaget (1964) describes three stages in the development of a systematic, or operational, approach to seriation. In the first stage, the child is unable to make the complete seriation. Either he declines to attempt the task at all, or he makes small seriations containing the elements in small juxtaposed series of two to three elements each. In the second stage, the child achieves the seriation through trial and error. Generally, he will measure each new stick next to every other stick, changing the total configuration many times

as he goes along. In this way, the seriation is actually based on fine perceptual discriminations.

In the third stage--generally achieved around seven years--the child approaches the task in a different manner: with a plan. He takes the largest (or smallest) of all the sticks, then the largest (or smallest) of all the remaining sticks, and so forth, until the seriation is complete. This method can be considered operational, since it is the only one that implies that any given element is simultaneously understood as larger than the preceding and smaller than those that succeed it. Piaget describes the operational schema of seriation as "necessarily anticipatory:"

> The subject knows in advance that by choosing the smallest element among those that remain, he will eventually build a series in which each term is larger than the preceding ones, which is why he is able to avoid any errors or inconsistencies. (Piaget, 1964, p. 251)

The questions remains, however: how does he know this? Piaget found that a child of five or six can draw a correct seriation before he can actually perform the seriation with objects. (A drawing, Piaget explains, does not imply reversibility, as does the systematic method of carrying out a seriation.) Perhaps the child abstracts the operational seriation from the perceptual configuration. Piaget, however, rejects this notion on the basis of experimental as well as theoretical grounds. Rather, he asserts that "serial operations are simply an interiorized result of previous activities." In this interpretation, both the

anticipatory image and the operational schema are derived from the subject's own actions in relation to serializable objects.

Seriation differs from a task such as class inclusion in that seriation does have a perceptual correlate, while class inclusion does not. The perceptual correlate may, in fact, aid in the development of operational achievement. This is the reason Piaget gives for the achievement of seriation earlier than the achievement of class inclusion. However, he stresses that the "good form" or perceptual aspect of an ordered series "only becomes perceptually apparent because of the corresponding sensori-motor action schema and its development as a whole."

Conservation of Matter. The importance of the concept of conservation for Piaget (1964) is evident in his statement that: "every notion, whether it be scientific or merely a matter of common sense, presupposes a set of principles of conservation, either explicit or implicit." He further states that it is a "necessary condition for all rational activity."

What, then, is the nature of such a principle? The task used to examine one aspect of conservation--conservation of matter--is simple enough. Two equal balls of clay are shown to the child and the shape of one of them is transformed. The child is asked whether the two balls are still "equal." (Generally the question is phrased as "do we still have the same amount to eat?") Piaget has found that the younger child denies the equality

of the two balls as soon as one of them is transformed. A little later, the child seems uncertain and tends to vacillate. between affirming and denying their equality. Finally, at around eight years of age, the question itself seems silly to the child: "Of course they're equal." It is as if he never thought otherwise.

These findings have several implications for the epistemology of thought. One implication is that the notion of conservation is not innate. The child who lacks conservation of matter relies totally upon his perception: when the two balls of clay look different, he affirms that they are different. However, it is not simply the reliance upon perception but also the inability to coordinate more than one dimension at a time that contributes to the child's lack of conservation. The child may perceive that one ball of clay becomes longer as it is rolled into a sausage; however, he does not also perceive--simultaneously--that the ball of clay has also become thinner.

It is also due to this lack of coordination between more than one dimension at a time that the child's justifications for his responses will seem contradictory. The child is unable to coordinate his responses, and thus does not feel compelled to be consistent.

It is only later in development, after a period of active experimentation with the object world, that the child comes to doubt his perceptions. As Piaget (1964) states: "Judgment comes into

play precisely when the perception proves inadequate, and only then." The transitional phase, from preoperational to concrete operational thinking is a period of relative disequilibrium. The child seems to understand the notion of conservation enough to cause him conflict, but not enough to allow him to affirm conservation with certainty. (To "understand the concept of conservation" is not the same as to understand the reasons for World War I. It implies a different level of conceptualization. It is more like an understanding of arithmetic: it allows the child to use the concept in a variety of particular situations.)

This transitional phase shows that the child understands what is being asked of him, even though he is not convinced of the necessity of the conservation of the whole quantity.

In the third stage, the necessity of conservation is affirmed in all cases. It seems such a simple, obvious thing to a child of this stage that he often acts as if it is beneath him to answer such a question. The child has discovered that "certain attributes of an object remain invariant in the wake of substantive changes in other attributes" (Flavell, 1963, p. 299).

The acquisition of the notion of conservation rests on two schemas: (1) the multiplication of relations, which allows the child to understand that the sausage may be longer but is is also thinner and that the two relationships are inversely proportional; (2) atomism, by which the child sees the ball of clay as a whole made up of tiny parts which only change their position with

respect to one another.

Conservation of Length. The task of conservation of length is to maintain the identity of two sticks of equal length whatever their position relative to one another. All children judge the two sticks to be of equal length when they are placed parallel to one another with their ends congruent. However, the younger child (approximately 4 or 5 years old) will deny their identity when one of the sticks is moved slightly to the right of the other. The question Piaget attempts to answer is, "Why?" What the preoperational child lacks is "a stable spatial field to act as a medium and a reference system" (Piaget, 1960, p. 91). That is, he does not conceive of space as a field made up of small sites which remain stationary.

Generally, for the preoperational child, the length of the two lines changes as a function of their end points. However, the child can err in one of several ways. The most common method is to follow the leading end of the moving stick, while ignoring the other end. The stick that moved beyond the stationary stick is judged to be the longer. Or, the child may simply focus on one end of the moving stick (rather than the movement itself) and whichever stick projects from the side the child is watching is judged the longest.

In the transitional stage (around 5 to 7 years old), the child again may show a variety of responses, some of which may

even confirm the notion of conservation of length. However, these notions are only tentatively arrived at and do not evidence the logical necessity which characterizes operational thinking. In some instances, children will deny equality when only one stick is moved and affirm it when they are both moved. Others may begin to notice that when one stick is longer on the right, the other is longer on the left. However, the child may respond that both are longer. A child may maintain conservation, but find it necessary to move the stick back to its original position to make sure that this is so. In any event, conservation of length is not seen as logically necessary.

Logical necessity is the hallmark of the third stage of conservation of length. The child will say something like, "of course it's the same. It was the same before, and you only moved it." However, Piaget stresses that the child's conservation is not based on identity, but rather on the notion that "when an object undergoes a change of position the empty sites which have previously been occupied are equivalent to sites which were previously empty and are now filled, so that the overall length of the object remains constant."

Class Inclusion. The task of class inclusion examines the development of the relationship between a class and its subclasses (Piaget, 1965). The child is shown 12 elephants and 2 horses (or any other two animals). After he has named these two animals,

he is asked to name some other animals to make sure that he has some notion of the class "animals." Then the child is asked to again reaffirm that the horses are animals and the elephants are animals.

The child is then asked four sets of questions, each dealing with a somewhat different aspect of class inclusion.

(1) The first question is, "On this table, are there more elephants or more animals?" This question attempts to determine whether the child is able to distinguish the qualities which define membership in a class and whether he can differentiate the objects in a class from the class itself.

(2) The second set of questions simply requires the child to compare the size of the two subclasses, horses and elephants.

(3) The third question deals with the subtraction of members from a class. "If I give you all the elephants, what remains in my bunch?" and "If I give you all the animals, what remains in my bunch?"

(4) The experiemnter then asks the child whether <u>in the world</u> (as opposed to on the table in front of them) there are more animals or more elephants.

Piaget has found that the child in the first stage of the development of class inclusion (generally around six years old) is unable to answer the question, "On this table, are there more elephants or more animals?" The child states that there are

more elephants. Why should he answer in this way? He seems to know what the general definition of an animal is; he knows that horses are animals and that elephants are animals as well. However, what the preoperational child is unable to do is to think simultaneously of the whole and its parts. " ...As soon as the whole is divided, even in thought, the parts cease to be included in it and are merely juxtaposed without synthesis." In other words, the child understands that a horse is a horse; and he understands that a horse is an animal. He cannot, however, think of a horse as being a horse and an animal at the same time.

In addition, the child in the first stage is unable to answer the question concerning the subtraction of classes. If the experimenter asks the child, "If I give you all the elephants, what remains in my bunch?" and "If I give you all the animals, what remains in my bunch?" the child will often become confused. He does not realize, in effect, that the whole is made up of the sum of its parts. In this instance, he does not realize that the class animals is made up of both horses and elephants.

The child in the second stage of the development of class inclusion (generally around seven years of age) will be able to answer the question regarding subtraction of classes, but he still is unable to simultaneously compare the whole with one of its parts. In Piagetian terms, he still cannot coordinate the comprehension of the class with its extension. (The comprehension of

a class is the sum of the qualities which define membership in a given class; the extension is the sum total of the objects which comprise the class.) Piaget puts the situation of the transitional child in the following terms:

> In effect, what he needs to be able to think and cannot, is this: "I recognize that A [elephants] is still a subportion of B [animals], and hence of lesser extension than B, even though I have momentarily abstracted it from B in order to compare their extensions. (Flavell, 1963, p. 308)

In the third stage, of course, the child can do exactly that. He is able to answer all the questions correctly.

2. Analysis of thought in schizophrenic children by task.

The following is an analysis of distinctive qualitative features of the schizophrenic protocols for each task. The features described are those which seemed particular to each task--either because they were similar to findings of Piaget for normal children, or because they were different from what Piaget described for normal children. My purpose is to describe in general terms the responses of the subjects to the particular situation that each task presented.

One-to-One-Correspondence. On the task of one-to-one correspondence, three of the subjects achieved at the concrete operational level, six achieved at the transitional level, and one achieved at the preoperational level of thought. Of the five tasks administered, this seemed to be the "easiest," in the sense that the average level of achievement was highest (see Table 3).

This is consistent with Piaget's findings for normal children.

Those children who achieved at the concrete operational level justified their responses in one of the two ways described by Piaget: by identity or reversibility.

(1) Identity. One subject (#9), for example, replied that there were the same amount of horses and elephants "because they're always the same."

(2) Reversibility. One subject (#4) replied, "all you did was to put these together and pull these apart." Often the verbalization of reversibility was incomplete. For example, one subject (#10) said, "because you didn't put any more in," while another (#3) said, "you didn't take none away." (Subject #3 was judged to be transitional.) Neither subject coordinated the two, at least on a verbal level.

The majority of schizophrenic children, however, did not achieve the level of concrete operations. One child (#6) was judged to be preoperational because he was unable to make the correct correspondence, an ability that is usually attained around four or five years of age. For those subjects who did not achieve at the concrete operational level, the perceptual elements of the situation dominated their thinking. This is evident in their justifications: (#8) "look how big...look how many." When one child (#7) was asked how he knew there were more horses than elephants, he replied, "just by looking."

Three of the schizophrenic children (#6, #9, #5) were unable to count the nine animals correctly. However, as Piaget found, the ability to count had very little influence on the achievement of one-to-one correspondence. One subject (#8) counted both rows incorrectly, and used this to justify equivalence: "ten, ten. They're both the same." Another child (#5), even though he counted each row correctly, still maintained, "there's not enough for each horse."

These results would have been predicted by Piaget as characteristic of a younger group of normal children. There were, however, other features of the protocols of schizophrenic children which are specific to them. For example, on this task, three of the schizophrenic children justified their responses by telling me how bright they were. While they were, indeed, a bright group of children, theirs were not responses normally given as justifications. Some examples are:

(#5) "I know, because I'm a bright boy and a smart boy."

(#2) "I'm always right. You can ask my mother."

(#4) "That's how I know, you see, 'cause I'm very smart."

Another unusual response was the assertion that I was either "cheating" or somehow using magic to fool them when I moved the animals. For example:

(#3) "You're gonna do a trick, and there won't be no more."

(#5) "You cheated...'cause you hid some of them over there, and you added some of them to the rest of the line..." "Hey, you doin' a magic trick on me."

(2) "You cheated me!"

Some of the children seemed to confuse or change the conceptual level of the question asked:

Are there more horses or more elephants?	(#2)	Even if they fought the horses would win.... 'Cause they're stronger.
Are there more bears or more monkeys?	(#3)	It looks like more bears, 'cause they're fatter.

Finally, one child (#3) spoke to each animal as he made the original correspondence: "You my pal, you my pal,...etc."

The responses of these children are qualitatively different from the responses of the normal preoperational child, who thinks that the elephants are more because they look like they're more. These responses seem to be based on a confusion (intentional or not) of the conceptual level of the situation.

Seriation. Seriation proved to be the most "difficult" task for the ten subjects, a finding whose implications will be discussed more fully in the discussion section. Six of the schizophrenic children achieved at the preoperational level, two were at the transitional level, and two at the concrete operational level.

Neither of the two children who achieved at the concrete operational level (that is, those who achieved the seriation through a logical method) was able to verbalize his method. One of them

(#9) said, "I just did it, I don't know how." The other (#3) said, "By lookin' at 'em...the smallest, then the biggest." In other words, the children who achieved concrete operations seemed unaware of the basis for their actions, or at least unable to verbalize them.

The two children who achieved seriation through the trial-and-error method (#4 and #8) had a long and difficult time of it. The majority of the children, however, were unable even to approach the task visually. One subject (#5) took each stick, one at a time, and put it into one of the piles: big and little. Then, he created his "staircase" by pushing the two piles together. Most of the subjects, however, chose the sticks randomly, sometimes lining up the bottoms, but most often making little or no attempt to create the desired effect.

However, even the most futile attempt generally seemed satisfactory to the subject. One in particular (#6), who chose his sticks randomly, rejoiced: "I'm doing it..I did it!" When asked <u>how</u> he did it, he pointed to each stick as he replied, "I just put this one here, and this one here, ..." etc. In general, the schizophrenic children seemed totally unaware of (or unconcerned about) their errors on seriation.

<u>Conservation of Matter</u>. In terms of the content of the responses, conservation of matter proved to be one of the most interesting tasks. Three of the subjects achieved at the concrete

operational level, three at the transitional level, and four at the preoperational level of thought.

Those subjects who achieved concrete operations justified their responses using the concept of identity:

(#10) "They was the same last time, you just made it longer."

(#4) "'Cause I measured them before...we have the same. But only you rolled it out."

(#2) "Yep, 'cause if they're the same the first time, they're the same all the rest of the time."

However, of those subjects who did not achieve concrete operations on this task, two seemed to invest me with magical or at least underhanded tactics when I changed the shape of the clay. One subject (#5) angrily asserted, "You cheated!" while another (#3) said wonderingly, "You supergirl."

Two of the subjects justified their responses by asserting their own brightness:

(#2) "'Cause I'm always right...'cause I'm smart."

(#7) "I think I'm right...'Cause I'm smarter than him."

Many of the children had unusual responses to the suggestion, "If I ate this and you ate this, who would have more to eat?" Generally, the children confused the conceptual level of the suggestion by taking it on a more literal level than it was intended.

One subject (#9) was unable to answer any of the

questions until I withdrew the suggestion altogether: "We would both have nothing, 'cause we can't eat clay...I can't tell about eating them...because it isn't possible." Another subject (#3) responded as follows to the same suggestion:

Examiner	Subject
	Eeegh!
Pretend.	Salty!

Later, when I suggested that we put the clay back the way it was before this same subject (#3) responded, "Eek! We'd kill them." Subject #6 first called his piece of clay a "sandwich," then "meatloaf," and finally licked it. Subject #3 called his piece of clay "cherry on a stick," and pretended to eat it.

Another example of what appears to a confusion of conceptual levels, which did not seem to be related to the suggestion of eating the clay, was the attempt of subject #5 to justify incorrect conclusions by the use of similes. Similes are abstract, rather sophisticated forms of comparison; but the way #5 uses them, they become almost confabulations.

Examiner	Subject
(Sausage.)	You have more to eat.
How do you know?	Because yours is longer.
Because it's longer than yours?	Yeah, let me show you. See, like this is some after-shave, right?
Yeah.	

Examiner	Subject
	This is the cologne. There's only a little bit of cologne, and a lot of after-shave.
(Pieces.)	I have more.
Why do you have more?	'Cause this is round and look at this. (Places my pieces in a row.) Depends if it's long.
OK. If you put the pieces in a line like you're doing, who would have more?	You.
Why would I have more?	Because first you have pieces. Like, say, a horse comes over, and like, say, how many clays you got? One, two, ... seven. Seven. And the big giant horse comes over. Each horse gets something to eat. Seven horses.... But if we pull this apart for the baby.... (At this point he trails off.)

Another tendency of schizophrenic children was to transform the clay into something else. One subject (#6), for example, called his piece of clay a "bunny rabbit," and another (#5) turned his into what he called a "hat."

Conservation of Length. On conservation of length, four children achieved at the concrete operational level of thought, two at the transitional level, and four at the preoperational level of thought.

Occassionally a child would make it very clear, through his justifications, how completely he understood the concept of length--

and how such knowledge is based on more than simply knowing the "right answer." The following subject (#9) shows this clearly in his response to my countersuggestion:

Examiner	Subject
I had a little boy in here yesterday who said that one looked longer.	Why did he say that?
It just looked that way to him. Think he was right?	Uh uh. No.
Why not?	Becuase then I could say that this one's bigger because it has a longer back. Or you could say that this one's bigger 'cause it has a longer front.
What's really true?	They're both the same length.

Those subjects who achieved concrete operations generally justified their responses by arguments of identity:

(#2) "They always will be the same...'cause they're the same size."

(#10) "That stick can't get shorter, unless you cut it."

(#3) "Because you didn't cut none off or add none."

The subjects who did not achieve the concrete operational level of thought often used the idea of measurement to justify their erroneous responses. One subject (#5), even though he originally said the two sticks were the same, "measured" them with his fingers and found one stick to be "seven inches" and the other to be "eight." "Nope," he concluded, "this is a bigger one. They're

not the same." This finding is consistent with Piaget's assertion that conservation of length is a prerequisite for true measurement.

Subject #5, judged to be preoperational, showed conceptual confusion on conservation of length by interpreting my hypothetical suggestion too literally:

Examiner	Subject
If an elephant would walk down this path, and another walks down this path, would they go the same?	You mean a real elephant?
A pretend elephant.	An elephant would just crush it.
But would they go the same length?	Depends if it's a baby elephant.

This same child also reiterated the belief that I was cheating or using magic to change the length of the sticks:

	Are you a magician?
What do you think?	You are one, 'cause you are playing a trick on me.
. . . .	'Cause. You cheated.
. . . .	... See, these are magic sticks, I think.

Finally, subject #6, judged to be preoperational, justified his assertion that one stick was longer than the other by saying, "'Cause, 'cause I know. I read books and you don't."

Class Inclusion

Three of the schizophrenic children achieved at the level

of concrete operations, four were judged to be transitional and three operational. Of the three children who were judged to be at the concrete operational level of thought (that is, who answered all the questions correctly) none was able to adequately verbalize the notion that an animal can belong to a class and a subclass at the same time. Rather, they seemed to base their responses on an implied comparison between two subgroups: elephants (or bears) and animals. For example:

> (#2) "Because a lot of things are animals and not too many things are elephants.
>
> (#3) "Because monkeys are animals and animals are animals."

The following subject (#9) seemed a bit closer to verbalizing a set/subset relationship when he invoked the names of animals as different from the quality of being an animal:

> (#9) "I don't know why. I guess there's a lot more names of animals, and then I guess every single name of those animals is the same amount as bears, so I guess there's a lot more animals than bears."

As Piaget found, when the question, "Are there more elephants or more animals?" was preceded by "In the world," the children were often able to respond correctly. For example, in the following subject (#10), jusged to be preoperational:

Examiner	Subject
On this table, do we have more elephants or more animals?	More elephants.
How do you know?	'Cause I counted.

Examiner	Subject
In the world, are there more animals or more elephants?	More animals than elephants.
How do you know?	'Cause an elephant is an animal.
How do you know there are more animals than elephants?	'Cause a man's an animal--lions, tigers, cats, dogs, lots of other things.

Again, counting seemed to be of little help to the schizophrenic children (as Piaget found with normal children). If anything, counting focused them on the perceptual configuration in front of them, hindering the achievement of class inclusion. This was shown in the following subject (#7), judged to be preoperational.

Examiner	Subject
Now, can you tell me how many horses are on this table?	Two.
And how many elephants are there?	Twelve.
On this table, do we have more elephants or more animals?	More elephants.
How do you know?	'Cause there's eighteen of them.

The most unusual feature of the task of class inclusion was the emotional responses that the questions often elicited from the children judged to be transitional, and several of the schizophrenic children responded with more than expected vehemence.

One child in particular (#4) resented being asked, "On the table, are there more animals or more elephants?"

> (#4) "Look, they're both fuckin' elephants, I mean they're both fuckin' animals!"
> "They're both animals, mother fucker! I don't think I can handle this!"

His response is interesting in that it shows that he can classify to a certain extent, but that he is unable to manipulate the concepts hierarchically.

Another child (#8), somewhat less picturesquely, admitted, "I'm guessing. I don't like that question!" A third (#5) refused to continue: "Oh, I don't want to do it! I hate it!" This child began throwing the animals around the room.

Summary. The qualitative analysis of the responses of schizophrenic children by task reveals that these protocols do contain responses not usually encountered in the protocols dealing with the cognitive processes within normal children. The structural features of these psychotic thought patterns are as follows:

1. Intelligence as justification. Throughout the tasks the children often used an insistence upon their own brightness as a justification for a particular response. The following are quotes from those children that used this sort of response as a justification.

Subject #2	One-to-One Correspondence
But are there more elephants, more horses, or are they the same?	They're both the same amount.
They are? You know, I had a little boy in here once before, and he said it looked like there were more horses. Do you think you're right, or do you think he's right?	I'm always right.
You're always right? Are you sure?	You can ask my mother.
How do you know, though; it looks like there are more horses.	Because I'm always right.

Subject #2	Conservation of Matter
How do you know?	'Cause I'm always right.
But why are you right? How do you know they're the same?	'Cause I'm smart.
Are you sure, though? Sure they're always the same?	Yep, 'cause if they're the same the first time, they're the same all the rest of the time.

Subject #7	Conservation of Matter
You know, I had a kid in here the other day who said that it didn't matter whether you took them apart or rolled them out--that they were always the same. Do you think you're right, or do you think he's right?	I think I'm right.
How do you know?	'Cause I'm smarter than him.

Subject #6	Conservation of Length
One more. Now watch this. If I more them like this, are they the same, or is one longer?	One's longer.
Which one?	(Points to the top stick.)
How do you know? How can you tell?	'Cause, 'cause I know. I read books and you don't.

Subject #4	One-to-One Correspondence
How do you know that they're the same?	'Cause all you did was spread them out.
Uh huh.	That's how I know, you see, 'cause I'm very smart.

Subject #5	One-to-One Correspondence
Why?	Because...I don't know a reason, but I know they're the same.
How do you know?	I know becuase I'm a bright boy and a smart boy.

2. Suspicious responses. The subjects who gave what I have termed "suspicious" responses expressed the belief that I was either cheating or using magical means to change the perceptual characteristics of the original shape or configuration of the testing material. The following are quotes from the children who gave these responses.

Subject #5	Conservation of Matter
All right. Let's put it back in a ball. Do you have more, do I have more, or do we have the same?	You cheated!
Why do you think I cheated?	To make them even.

Subject #3	One-to-One Correspondence
OK, watch what I do now.	You're gonna do a trick, and there won't be no more.
(Extend monkeys.) Are there more bears, more monkeys, or are they both the same?	There's more bears.

Subject #2	One-to-One Correspondence
Watch carefully what I do. (Spread out elephants.) Is there still one elephant for each horse, are there more horses, more elephants, or are they the same?	They're different.
How are they different?	Wait, let me see. (Counts horses and elephants.) No, still the same.
How do you know?	You cheated me.
How do you know?	No, they're not the same. (Counts again.) Yeah, they're the same.

Subject #5	One-to-One Correspondence
How do you know that there are more elephants?	I know why.
	You cheated. I know why.
Why?	
Why?	'Cause you hid some of them over there and you added some of them to the rest of the line.

(Original position.) Are they the same again?	Hey, they are the same. Before you fooled me. Hey, you doin' a magic trick on me!
I am? Why do you think so?	'Cause. Are you a magician?
You think I'm a magician?	(Nods yes.)
Why do you think I'm a magician?	'Cause, I can tell.
How can you tell?	Because you know magic.
I know magic? Why do you think I know magic?	'Cause when you spreaded the horses like that, I think there was one extra horse.
You do. Well, did you see me add any or take any away?	No, but when you started to begin this stuff, I think you put an extra one here.
You think I did? But look, they're the same.	Yeah, 'cause you're magic, that's why. Wait a minute. I swear there was another elephant here. Behind this last one. I don't know what it was.

Subject #3 Conservation of Matter

All right, let's do that.	Ooooh. You supergirl.
Are they the same again?	(Pause. Looks at them.) They're the same now.

Subject #5 Conservation of Matter

OK, now watch what I do. Now is one longer than the other, or are they both the same?	Are you a magician?
What do you think?	You are one, 'cause you are playing a trick on me.

What do you think? Are they the same, or are they different?	I think...let's see. I'll tell you in a second. This one (bottom) was bigger before, and now this one's (top) longer.
So now the top one's longer?	The bottom.
Oh, my bottom one, and your top one. So this one was longer before, and now this one's longer. How do you know?	'Cause. You cheated.
What do you mean, I cheated?	Easy. Let me show you what you did.
What did I do?	You went like this and rolled the lines up. See, these are magic sticks, I think.

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3. Concrete responses. Many of the unusual responses given by the schizophrenic children involved a confusion of the conceptual level of the questions asked, the suggestions given, or the tasks themselves. I have called these responses "concrete" because they represent a failure of the child to assume the appropriate abstract attitude expected of children their age and younger. (This use of the word "concrete" is not to be confused with the concrete operational period.) There were essentially three kinds of concrete responses.

(a) Often a subject changed the level of conceptualization of a specific question. The two examples of this kind of response are as follows:

Subject #2	One-to-One Correspondence
Watch what I do. (Spread out horses.)	We still do.
Are they the same now? Are there more horses or more elephants?	Still the same.
How do you know?	Even though if they fought, the elephants would win.
Even though if they fought, the elephants would win? Why would the elephants win?	'Cause they're stronger.

Subject #3	One-to-One Correspondence
How do you know?	'Cause you didn't take none away.
Are you sure? It looks like there are more bears.	(Pause. Hits each bear in turn.) Yeah, it looks like more bears 'cause they're fatter.

(b) When a hypothetical suggestion was given by the experimenter, it was often taken quite literally by the subjects. This occurred most frequently to the suggestion given on conservation of matter: "What if you ate this and I ate this?" It also occurred to the hypothetical situation presented in conservation of length: "If one elephant went down this path, and another went down the other path...." The following quotes are taken from those children giving this type of response.

Subject #9	Conservation of Matter
OK. If you ate this one, and I ate this one, would you have more to eat, would I have more to eat, or would we both have the same?	(Pause.) We would both have nothing, 'cause we can't eat clay.
Well, pretend. If we could--just pretend that those are M&Ms, would you have more to eat, would I have more to eat, or would we have the same?	(Pause.) We would both have the same.
How do you know?	(Pause.) I don't know.
You don't know?	No, I don't know.
OK. Let's try this....	How're you supposed to tell?
Well, did you say that they were both the same at first? That they were both equal balls?	(Pause.) Uh, no, they're not.
All right. Make them so that they're two equal balls. Can you do that?	No.
Why not?	'Cause I can't tell about eating them.
Why not?	(Pause). Because it isn't possible.

Subject #6	Conservation of Matter
Now, this is yours and this is mine. What if I did this.... (Pieces.) If you would eat all these, and I would eat this, will we have the same to eat, will you have more, or would I have more?	What are you doing?...
	You would have more.
Why would I have more?	(Licks clay.)

OK. Now watch what I do with yours. (Sausage.) Now, do I have more, do you have more, or do we have the same to eat?

I show you. That one.

What does that mean?

It means when we pull the sandwich, that's how more I have.

Subject #3 Conservation of Matter

All right. Say that I eat this one (pie) and you ate this one, would we both have the same, would you have more or would I have more?

Mmmmmmm. You would have more.

Why do you think so?

Because yours is rounder, and I feel like eating it now. (Puts ball on top of pie and brings it to his mouth like a sandwich.) Cherry on a stick.

Now, if I gave you this one to eat, and I have this one to eat....

Eeegh.

Pretend.

Salty.

If we put them back the way they were before....

Eek! We'd kill them.

Subject #6 Conservation of Matter

Both of us don't have more?

Let me have it. (Tries to put the two pieces of clay together.)

What is that?

Meatloaf.

Subject #5	Conservation of Length
Like this, are they still the same length? If an elephant would walk down this path, and another elephant walks down this path, would they both go the same?	You mean a real elephant?
A pretend elephant.	An elephant would just crush it.
But would they go the same length?	Depends if it's a baby elephant.

(c) Another, related tendency of the schizophrenic children was to concretize the testing material by speaking of it as if it were something else. The specific responses in this category are described below.

Subject #3	One-to-One Correspondence
All right. What I'd like you to do is take enough monkeys for each bear, so that each bear has a monkey, OK?	OK. (Places monkey below bear on edge of table.)
Put it up here.	You my pal, you my pal, you my pal, you my pal.... (He's speaking to each monkey as he places it next to a bear.)

Subject #6	Conservation of Matter
What if you put yours back together?	No, this is a bunny rabbit. What's his name?

Subject #5	Conservation of Matter
Now, do you have more to eat, do I have more to eat, or do we have the same?	You have more to eat.
How do you know?	Because yours is longer.
Because it's longer than yours?	Yeah, let me show you. See, like this is some after-shave, right?
Yeah.	This is the cologne. There's only a little bit of cologne, and a lot of after-shave.
---	---
OK, if you put the pieces in a line like you're doing, who would have more?	You.
Why would I have more?	Because first you have pieces. Like, say, a horse comes over, and like say how many clays you got? One, two...seven. Seven. And the big giant horse comes over. Each horse gets something to eat. Seven horses. But if we pull apart for the baby.

3. Emotional responses. Finally, angry emotional responses were encountered on class inclusion. The specific responses are described below:

Subject #8	Class Inclusion
If I give you all the animals, what remains in my bunch?	Nothing.
On this table, do we have more animals or more elephants?	I don't know! I don't like that question!

Subject #4	Class Inclusion
So what does that mean? On this table, do we have more elephants or more animals?	But they're both animals! What do you mean?
Are there more animals or more elephants?	Look, thy're both fuckin' elephants, I mean, they're both fuckin' animals.
---	---
Now, on this table, do we have more animals or more elephants?	They're both animals, mother fucker.
Well, in the world, are there more animals or more elephants?	Look, they're both fuckin' animals.
OK.	I don't think I can handle it.

Subject #5	Class Inclusion
On this table, are there more elephants or more animals?	More animals.
How do you know?	Oh no, good grief.
How do you know that there are more animals on the table than elephants?	'Cause. The ele...the...I think it's more elephants. No, I don't know which one, I can't make up my mind.
---	---
How do you know?	Oh, boy, not this "how do you know" again.
Why do you think there are more elephants?	Because elephants...I don't know, but I think there's more elephants on this table. 'Cause there's twelve elephants here and two ponies. Oh, I don't want to do it. I hate it.

OK. Just answer this. In the world, are there more animals or more elephants?	More animals.
Why?	I don't know. (Starts throwing animals around room.)

3. Analysis of thought in schizophrenic children by subject.

The following section presents an analysis of the responses of each subject, emphasizing those features described as unusual in the previous section and paying particular attention to when those responses were given.

Anthony (1958) warns that the first ten schizophrenic children a clinician sees will convince him that he is not dealing with a unitary disorder. The ten subjects in this study proved to be no exception. They ranged from obviously disturbed to seemingly normal, from withdrawn and depressed to lively and outgoing. In short, they varied--in personality as well as in the patterning of their responses. What they had in common (aside from their average intelligence) was a disturbance of behavior severe enough to require hospitalization, and of such a nature as to be called schizophrenic.

Subject #1

Age: 9-10

V.I.Q. = 114
P.I.Q. = 93
F.S.I.Q. = 104

One-to-one correspondence	Transitional	2
Seriation	Preoperational	1
Conservation of matter	Preoperational	1
Conservation of length	Transitional	2
Class inclusion	Transitional	2
Average	Transitional	1.6

Subject #1 was a very quiet, withdrawn child, who--though cooperative--was generally uncommunicative. He did not seem anxious about the testing situation, but neither was he interested in it. The overall impression Subject #1 gave was of a rather listless, subdued child.

Subject #1, although he is nine years, ten months old, did not achieve the concrete operational level on any of the tasks. In addition, he did not give any of the unusual responses described in the previous section. The following is excerpted from one-to-one correspondence. It is an example of the kind of transitional thinking that is seen in normal--though younger--children.

Examiner	Subject
(Spread out monkeys.) Is there still one monkey for each bear? Are there more bears, more monkeys, or are there the same?	More monkeys than bears.
More monkeys?	More monkeys.
How do you know?	Well, it's hard to say.
What makes you think that there are more monkeys than bears?	Well, 'cause the bears are less; now the bears are less and the monkeys are more.
If we put them as before, would we have one monkey for each bear?	(Nods.)

Examiner	Subject
(Original position.) Now are there more monkeys than bears?	No.
Just a minute ago you said there were.	No.
(Spread out bears.) Are there more bears, more monkeys, or are there the same?	More bears.
Just a minute ago you said there were more monkeys. How do you know that there are more bears than monkeys?	'Cause now that the bears are more, the monkeys are less this time.

In this example, the child clearly is relying on the perceptual aspects of the situation. In addition, he sees no contradiction in his various responses. In this child's responses, there is none of the confusion that characterizes many of the examples described in the previous section.

Subject #2

Age: 8-1

V.I.Q. = 145
P.I.Q. = 132
F.S.I.Q. = 143

One-to-one correspondence	Transitional	2
Seriation	Preoperational	1
Conservation of matter	Concrete Operations	3
Conservation of length	Concrete Operations	3
Class inclusion	Concrete Operations	3
Average	Transitional	2.4

Subject #2 was a lively, bright child (as his I.Q. indicates), anxious about the tasks, but cheerfully doing his best to hide it. He was eager to please and very conscious of

how he was performing. My overall impression of him was of a bright, overly sensitive child, but one who was quite willing to interact.

Subject #2 achieved the concrete operational level of thought on three tasks. However, these were the tasks that, according to Piagetian data, should have been achieved last.

Subject #2 gave several responses which were characterized in the previous section as unusual. The following is excerpted from one-to-one correspondence:

Examiner	Subject
Watch carefully what I do. (Spread out elephants.) Is there still one elephant for each horse, are there more horses, more elephants, or are they the same?	They're different.
How are they different?	Wait, let me see. (Counts horses and elephants.) No, still the same.
How do you know?	You cheated me!
How do you know?	No, they're not the same. (Counts again.) Yeah, they're the same.
How do you know?	Because.
Because why?	This could go here, this could go here,...(etc.). (Puts them back into correspondence.)
Well....	I thought they was different 'cause I didn't see the other pieces.

Examiner	Subject
Since you've put them back the way they were before, now do I have one elephant for each horse?	Yep.
Watch what I do. (Spread out horses.)	We still do.
Are they the same now? Are there more horses or more elephants?	Still the same.
How do you know?	Even though if they fought, the elephants would win.
Why would the elephants win?	'Cause they're stronger.
Oh, I see.	Doesn't have to be more elephants.
But are there more elephants, more horses, or are they the same?	They're both the same amount.
They are? You know, I had a little boy in here once before, and he said it looked like there were more horses. Do you think you're right, or do you think he's right?	I'm always right.
You're always right? Are you sure?	You can ask my mother.

Subject #2 perceives a difference in the two rows of animals when the elephants are spread out. For him, it is not logically necessary that the two rows remain the same. Thus, he must count both rows each time, or move them back into their original correspondence before he can maintain their identity once more. However, Subject #2 does not justify his response

(they're different") with a perceptual argument, either. He is conflicted and must find some way to resolve his conflict.

First, he explains his conflict by saying that I was cheating. Then he explains his lack of consistency by saying that he "didn't see the other pieces." When I pressed him for a verbal justification, he deflected my question by changing the conceptual level of the question--from "more" to "stronger." In this case, however, he does not seem to be confused about the different conceptual levels, but rather substituting one level (with which he is familiar) with another (with which he is not so sure). Finally, in response to my countersuggestion, he responds with perhaps the ultimate justification--"You can ask my mother."

Compare these responses with his response on conservation of matter:

Examiner	Subject
Are you sure, though? Sure they're always the same?	Yep, 'cause if they're the same the first time, they're the same all the rest of the time.

It is important to note that Subject #2 showed these responses on one-to-one correspondence--the only task he did not achieve.

On conservation of matter, which he did achieve, Subject #2 used the response "'cause I'm smart" as a justification. However, he could--and did--provide the appropriate justification in

addition to that unusual justification.

Subject #3

Age: 10-4

V.I.Q. = 103
P.I.Q. = 124
F.S.I.Q. = 114

One-to-one correspondence	Transitional	2
Seriation	Concrete Operational	3
Conservation of matter	Transitional	2
Conservation of length	Concrete Operational	3
Class inclusion	Concrete Operational	3
Average	Concrete Operational	2.6

Subject #3 was a stocky, enthusiastic Spanish boy. He was one of the most enjoyable of the subjects to test, perhaps because he seemed to be having the most fun. Subject #3 obviously used humor and teasing in a defensive way, but also in a friendly way.

Subject #3 was one of the two subjects judged to be at the concrete operational level of thought. In addition, he was one of the same two subjects able to achieve the concrete operational level on seriation.

Subject #3 did give several unusual responses. On one-to-one correspondence, he spoke to each monkey as he made the original correspondence: "You my pal, you my pal, you my pal,..." When I began to spread the monkeys apart, he accused, "You're gonna do a trick and there won't be no more."

On conservation of matter, Subject #3 responded quite strongly to my hypothetical remark about eating the clay:

Examiner	Subject
Now, if I gave you this one to eat, and I have this one to eat....	Eeeegh!
Pretend.	Salty!

Similarly, when I suggested that we put the sausage shape into its original form:

Examiner	Subject
If we put them back the way they were before....	Eek! We'd kill them.
Would we both have the same?	Yeah.
All right, let's do that.	Oooooh. You supergirl.

Finally, Subject #3 pretended to turn the clay into food, and brought it to his mouth as if to eat it:

Why do you think so?	Because yours is rounder, and I feel like eating it now. (Puts ball on top of pie shape and brings it to his mouth like a sandwich.) Cherry on a stick.

I am not suggesting that Subject #3 actually <u>believed</u> that I was supergirl, that we would "kill" the clay, or that the clay actually was "cherry on a stick." Clearly, he was teasing. However, it is unusual for children to respond in that manner to a "testing" situation with an adult. In addition, the content of his teasing was unusual--whether he believed it or not. It represents a concretization of the situation presented to him.

And again, it is important to point out that this type of behavior was only observed on those tasks on which he failed to achieve concrete operations.

Subject #4

Age: 8-7

V.I.Q. = 114
P.I.Q. = 87
F.S.I.Q. = 101

One-to-one correspondence	Concrete Operational	3
Seriation	Transitional	2
Conservation of matter	Concrete Operational	3
Conservation of length	Transitional	2
Class inclusion	Transitional	2
Average	Transitional	2.4

Subject #4 was a large, unwieldy child--certainly the most overtly disturbed of all the subjects. He had to be tested over numerous sessions because he was so easily frustrated and emotionally volatile. At one point he began breaking the testing materials and threatening me. Even when he was cooperative, I was never certain of what he would do next.

Subject #4 was one of the two children who remarked on how bright they were during a task in which they achieved concrete operations (as #2 also did on conservation of matter). As with Subject #2, it was an added justification--after an appropriate one had been given. The following is from one-to-one correspondence:

Examiner	Subject
Are there more horses, more elephants, or are there the same?	Same.
How do you know that they're the same?	'Cause all you did was spread them out.
Uh huh.	That's how I know, you see, 'cause I'm very smart.

There was little else remarkable about Subject #4's responses on other tasks, except for class inclusion. He became quite angry whenever I asked him to compare elephants and animals.

Examiner	Subject
On this table, do we have more elephants or more animals?	Well, an elephant is an animal.
Yes, but what does that mean? On this table, do we have more elephants or more animals?	But they're both animals! What do you mean?
Are there more animals or more elephants?	Look, they're both fuckin' elephants, I mean, they're both fuckin' animals!
. . . .	. . . .
These animals are all just on the table, and I give you all the elephants. What remains for me?	Horses.
Now, if I give you all the animals, what's left in my bunch?	Elephants.
Now, on this table, do we have more elephants or more animals?	They're both animals, mother fucker.

Examiner	Subject
Well, in the world, are there more animals or more elephants?	Look, they're both fuckin' animals.
OK.	I don't think I can handle it.

Compare the previous responses with his following responses from conservation of matter.

(Sausage.) All right, do you have more, do I have more, or do we have the same?	We have the same. But only you rolled it out.
. . . .	. . . .
(Pie.) Now do you have more, do I have more, or do we have the same?	Same.
Still the same? Now I had a little boy in here yesterday who said that this one--because it was fatter and flatter--looked like it was more.	No, it's still the same.
Still the same?	Because I measured it before.

Subject #5

Age: 10-9

V.I.Q. = 106
P.I.Q. = 111
F.S.I.Q. = 109

One-to-one correspondence	Transitional	2
Seriation	Preoperational	1
Conservation of matter	Preoperational	1
Conservation of length	Preoperational	1
Class inclusion	Transitional	2
Average	Preoperational	1.4

Subject #5 was a cute, owlish-looking little boy with thick horn-rimmed glasses. He seemed much younger than the other children, even though he was one of the oldest. He approached the tasks in a serious, cooperative manner, but he was very unsure of himself.

Subject #5 did not achieve the concrete operational level on any task.

On one-to-one correspondence, he was convinced that I was either cheating or using magic to fool him:

Examiner	Subject
How do you know there are more elephants?	I know why.
Why?	You cheated. I know why.
. . . .	. . . .
(Original position.) Are they the same again?	Hey, they are the same. Before you fooled me. Hey, you doin' a magic trick on me.
I am? Why do you think so?	'Cause. Are you a magician?
You think I'm a magician?	(Nods yes.)
How can you tell?	Because you know magic.
I know magic? Why do you think I know magic?	'Cause when you spreaded the horses like that, I think there was one extra horse.
You do. Well, did you see me add any or take any away?	No, but when you started to begin this stuff, I think you put an extra one here.
You think I did? But look, they're the same.	Yeah, 'cause you're magic, that's why. Wait a minute, I swear there was another elephant here. Behind this last one. I don't know what it was.

As so many of the children, when Subject #5 had no justification, he invoked his intelligence. The following is from one-to-one correspondence:

Examiner	Subject
What do you think?	I think they're the same.
Why?	Because...I don't know a reason, but I know they're the same.
How do you know?	I know becuase I'm a bright boy and a smart boy.

On conservation of matter, Subject #5 tries, unsuccessfully, to justify his responses using similes:

(Sausage.) Now, do you have more to eat, do I have more to eat, or do we have the same?	You have more to eat.
How do you know?	Because yours is longer.
Because it's longer than yours?	Yeah, let me show you. See, like this is some after-shave, right?
Yeah.	This is the cologne. There's only a little bit of cologne and a lot of after-shave
So, I would have more?	You would have more.
I see. What would happen... What if we put them back the way they were?	Well, it might be the same size. It might not.
. . . .	. . . .
Well, right now, the way they are now, do I have more, do you have more, or do we have the same? (Pieces.)	Which one's mine first?

Examiner	Subject
That one's yours and these are mine.	I have more.
Why do you have more?	'Cause this is round and look at this. Depends if it's long. (Places pieces in a row.)
OK, if you put the pieces in a line like you're doing, who would have more?	You.
Why would I have more?	Because you have pieces. Like, say, a horse comes over, and like say, how many clays you got? One, two...seven. Seven. And the big giant horse comes over. Each horse gets something to eat. Seven horses. But if we pull this apart for the baby... (At this point he trailed off.)

As I mentioned in the previous section, these attempts at abstract thinking by concrete examples are unsuccessful, and become confabulations. His confusion and his groping attempts at logic are almost painful to observe (especially in a child nearing eleven). However, it is significant that he does feel compelled to make that attempt. A younger child might simply have said, "Because that's how it looks."

Subject #5 also gave unusual responses to conservation of length. When I first used the suggestion of an elephant going down a path to demonstrate the concept of length (a technique which is generally helpful), he responded:

Examiner	Subject
If an elephant would walk down this path, and another elephant walks down this path, would they both go the same?	You mean a real elephant?
A pretend elephant.	An elephant would just crush it.
But would they go the same length?	Depends if it's a baby elephant.

Also on conservation of length, Subject #5 again reiterated his belief that I was a magician:

OK, now watch what I do. Now, is one longer than the other, or are they both the same?	Are you a magician?
What do you think?	You are one, 'cause you are playing a trick on me.

Finally, on class inclusion, Subject #5 became distressed when I asked him to compare animals and elephants:

On this table, are there more elephants or more animals?	More animals.
How do you know?	Oh, no, good grief.
How do you know that there are more animals on the table than elephants?	'Cause. The ele...the... I think it's more elephants. No, I don't know which one, I can't make up my mind.
. . . .	. . . .
On this table, do we have more animals or more elephants?	More elephants.
How do you know?	Oh, boy, not this "how do you know" again.

Examiner	Subject
Why do you think there are more elephants?	Because, elephants...I don't know, but I think there's more elephants on this table. 'Cause there's twelve elephants here and two ponies. Oh, I don't want to do it. I hate it.
OK, just answer this. In the world, are there more animals or more elephants?	More animals.
Why?	I don't know! (Starts throwing animals around the room.)

Subject #6

Age: 8-8

V.I.Q. = 113
P.I.Q. = 111
F.S.I.Q. = 113

One-to-one correspondence	Preoperational	1
Seriation	Preoperational	1
Conservation of matter	Preoperational	1
Conservation of length	Preoperational	1
Class inclusion	Preoperational	1
Average	Preoperational	1

Subject #6 was a small, generally quiet boy who nonetheless was highly labile and impulsive: he also had to be tested over several sessions. He was the most overtly needy of all the subjects, begging for me to come back or for me to give him the testing materials. Generally I took each subject to the coffee shop after testing was completed. This held no joys for Subject #6. He was only satisfied when I left all of the clay with him.

Subject #6 achieved at the preoperational level of thought on all tasks. On one-to-one correspondence, he was unable even to make the original correspondence. He seemed unconcerned about his responses, and about his justifications:

Examiner	Subject
How do you know they're the same?	'Cause, they're the same.
Just a minute ago, you said there were more elephants. Which is right?	There were more elephants.
. . . .	. . . .
How do you know?	Because there is.
Do you know why?	Why?
Do you know why?	No.
How do you know there are more elephants?	Because they're elephants.

On seriation, Subject #6 seemed quite pleased with his performance, even though he chose the sticks randomly: "I'm doing it! I did it!"

On conservation of matter, however, my suggestion regarding "eating" the clay triggered an unusual, confused response. Subject #6 became progressively more removed from the testing situation until he refused to participate at all.

Examiner	Subject
(Sausage.) Now, do I have more, do you have more, or do we have the same to eat?	I show you. That one.
What does that mean?	It means when we pull the sandwich, that's how more I have.

Examiner	Subject
Who has more?	I do.
. . . .	. . . .
(Pieces.) If you would eat all these, and I would this, will we have the same to eat, will you have more, or would I have more?	You would have more.
Why would I have more?	(Licks clay.)
Why would I have more?	Yes. I want more. I want some more. (Takes the pieces and puts them back together.)
What if you put yours back together?	No, this is a bunny rabbit. What's his name?
Harvey. How about that? Now, what if I put them back together into two round balls?	Sister, sister, you are a sisty; sisty, sisty, you are a sisty....(in a sing-song voice.)

On conservation of length, Subject #6 was unable even to pick the original two sticks. Later, his justification for his response asserting the difference between the two sticks was similar in kind to the justifications of "I'm smart."

How do you know? How can you tell?	'Cause, 'cause I know. I read books and you don't.

Subject #7

Age: 10-7	V.I.Q. = 96 P.I.Q. = 97 F.S.I.Q. = 95

One-to-one correspondence	Transitional	2
Seriation	Preoperational	1
Conservation of matter	Transitional	2
Conservation of length	Preoperational	1
Class inclusion	Preoperational	1
Average	Preoperational	1.4

Subject #7 was very tall and thin--the only Black subject in the group. He was a cooperative child, but rather distant emotionally. He responded in a slow and careful manner, and although he did not seem anxious, neither did he seem to enjoy himself.

Subject #7 did not achieve concrete operations on any of the tasks. However, except for one instance on conservation of matter, on no other task did he give any ususual responses. On conservation of matter, when I presented him with a counter-suggestion, his response was as follows:

Examiner	Subject
You know, I had a kid in here the other day who said that it didn't matter whether you took them apart or rolled them out--that they were always the same. Do you think you're right or do you think he's right?	I think I'm right.
How do you know?	'Cause I'm smarter than him.

Generally, Subject #7's justifications were based on his perceptions. For example (this is also taken from one-to-one correspondence):

Examiner	Subject
Are there more horses, more elephants, or are there the same?	More elephants.
How do you know there are more elephants?	'Cause.
'Cause why?	By looking.

Subject #8

Age: 9-11

V.I.Q. = 81
P.I.Q. = 115
F.S.I.Q. = 97

One-to-one correspondence	Transitional	2
Seriation	Transitional	2
Conservation of matter	Preoperational	1
Conservation of length	Preoperational	1
Class inclusion	Transitional	2
Average	Transitional	1.6

Subject #8 was a verbal and enthusiastic child, in many ways similar to Subject #3. He also teased and joked--as a diversionary and defensive tactic--but he lacked Subject #3's real humor and ability to charm.

Subject #8 did not achieve the concrete operational level on any of the tasks. Generally, his justifications were based on the perceptual aspects of the tasks. For example, on one-to-one correspondence:

Examiner	Subject
Are there more horses, more elephants, or are there the same?	More horses.
How do you know there are more horses?	Look how big...Look how many.

Subject #8 became annoyed when pressed for a justification on class inclusion.

Examiner	Subject
Now, on this table, do we have more elephants or more animals?	More animals.
How do you know?	More elephants. I don't want to do this again.
. . . .	. . . .
If I give you all the elephants, what remains in my bunch?	The horses.
And if I give you all the animals, what remains in my bunch?	Nothing.
On this table, do we have more animals or more elephants?	I don't know! I don't like that question!

Subject #8 gave no other kinds of unusual responses on any of the other tasks.

Subject #9

Age: 8-1

V.I.Q. = 118
P.I.Q. = 125
F.S.I.Q. = 123

One-to-one correspondence	Concrete Operational	3
Seriation	Concrete Operational	3
Conservation of matter	Transitional	2
Conservation of length	Concrete Operational	3
Class inclusion	Concrete Operational	3
Average	Concrete Operational	2.8

Subject #9 was a sweet and friendly child who seemed to enjoy the testing situation. He was one of the youngest subjects, yet he achieved at the concrete operational level. Only on conservation of matter, the only task he did not achieve, did he give any unusual response. He took the suggestion of "eating" the clay quite literally:

Examiner	Subject
OK. If you ate this one, and I ate this one, would you have more to eat, would I have more to eat, or would we have the same?	(Pause.) We would both have nothing, 'cause we can't eat clay.
Well, pretend...would you have more to eat, would I have more to eat or would we have the same?	(Pause.) We would both have the same.
How do you know?	(Pause.) I don't know.
OK. Let's try this...	How're you supposed to tell?
Well, did you say that they were both the same at first? That they were both equal balls?	(Pause.) Uh, no, they're not.
All right. Make them so they're two equal balls. Can you do that?	No.
Why not?	'Cause I can't tell about eating them.
Why not?	(Pause.) Because it isn't possible.

Once I stopped suggesting we eat it, Subject #9 confirmed that all variations of the clay were equal--until I broke it into pieces. His justification for this was "'Cause they're almost always the same."

Compare the responses quoted above with the responses below, excerpted from conservation of length:

Examiner	Subject
Is one longer or are they both the same?	They're both the same.
How do you know?	You might say that this one's longer because this one's gone back, but they're really the same length.
How do you know that they're the same length?	Because it's all the same length. In this kind of thing. (Laughs.)

On conservation of length, Subject #9 is secure enough in his own logic that he is able to speculate and even be playful, in a non-teasing way.

Subject #10

Age: 10-3

V.I.Q. = 106
P.I.Q. = 87
F.S.I.Q. = 97

One-to-one correspondence	Concrete Operational	3
Seriation	Preoperational	1
Conservation of matter	Concrete Operational	3
Conservation of length	Concrete Operational	3
Class inclusion	Preoperational	1
Average	Transitional	2.2

Subject #10 was a dark, handsome boy who resented being tested. He became quickly exasperated by the "simplicity" of the questions, and throughout the sessions conveyed the impression that it was all quite beneath him.

Subject #10 gave no unusual responses to any of the tasks. His justifications were concise and appropriate. For example, on conservation of matter:

Examiner	Subject
(Sausage.) Now do you have more to eat, do I have more to eat, or do we have the same?	We have equal.
How do you know?	Because they was the same last time, you just made it longer. It's still equal.

In fact, Subject #10's protocols were unusual only because he failed to achieve seriation.

Summary. The qualitative analysis of the protocols of schizophrenic children by subject reveals a relationship between the achievement of concrete operations and the presence of an unusual response: If a child did not achieve at the concrete operational level on a particular task, he was much more likely to give an unusual response than if he did achieve at the concrete operational level on that task.

The results of the qualitative analysis of the protocols of schizophrenic children by subject can be summarized in the following way:

1. Those unusual responses described in the previous section as:

   a. Suspicious responses, and

   b. Concrete responses

were given only on those tasks which were not achieved at the concrete operational level.

2. Similarly, emotional responses encountered on class inclusion were only expressed on tasks not achieved at the concrete operational level.

3. The justification "Because I'm smart" (or some variation) was given as the sole justification only on those tasks not achieved at the concrete operational level. On two tasks it was given when the subject had achieved the concrete operationla level. However, in both cases it was given as an additional justification--the subject was able to give an appropriate justification as well.

The relationship between an unusual response and the level of achievement of the task was not absolute. That is, if a subject did not achieve concrete operations on a task, this did not necessarily mean that he would give an unusual response. In fact, two of the subjects gave none of the unusual responses described above. Rather, the lack of concrete operational thinking on a particular task made it much more likely that a subject would give an unusual response than if he had achieved the concrete operational level on that task.

Table 5 presents the occurrence of unusual responses for each subject on each task.

Table 5

Occurrence of Unusual Responses

Subjects	One-to-One Correspondence	Seriation	Conservation of Matter	Conservation of Length	Class Inclusion
# 1	2	1	1	2	2
# 2	2 2. 3.(a) 1.	1 1.	3	3	3
# 3	2 3.(c) 2. 3.(a)	3	2 3.(b) 3.(b) 2. 3.(c)	3	3
# 4	3 1.	2	3	2 1.	2 4.
# 5	2 2. 1. 2.	1	1 3.(c) 2. 3.(c)	1 3.(a) 2.	2 4.
# 6	1	1	1 3.(b) 3.(c) 3.(b) 3.(c)	1 1.	1
# 7	2	1	2 1.	1	1
# 8	2	2	1	1	2 4.
# 9	3	3	2 3.(b)	3	3
#10	3	1	3	3	1

1. = Intellect as justification
2. = Suspicious response
3. = Concrete responses
   (a)
   (b) see pp. 105-110
   (c)
4. = Emotional response

The number in the left-hand corner of each cell represents the level of achievement of that task (1=pre-operational, 2=transitional, 3= concrete operational).

CHAPTER IV

DISCUSSION

The first finding pertinent to the structure of thought in schizophrenic children is that the schizophrenic children in this sample achieved at a much lower level than would be expected of normal children of the same age. No subject achieved at the concrete operational level on all tasks. In addition, half of the subjects did not achieve the concrete operational level on any task. The low level of achievement of these subjects is the most striking finding of this study--particularly in view of their high intellectual level.

In terms of structural organization, the children in this sample did not achieve the tasks in the same order as Piaget found for normal children. More importantly, schizophrenic test performance on each of the five tasks was found to be essentially unrelated to performance on the other tasks. In addition, performance on the tasks was not related in any significant way to age. These findings are consistent with Mook's (1972) findings for the development of causal thought: "The schizophrenic children failed to achieve structural integration at any stage level of causal thought development." The only subject in the present study who was at the same level of achievement for all tasks was consistently preoperational.

Voyat (1973) has pointed out that an operation is always part of a larger structure. A cognitive operation never exists

in isolation, but is always related to some other operation in such a way that the acquisition of one particular operation makes that of another possible. For Voyat (1969), a structure is an abstraction, but it is an abstraction with a psychological meaning. For the schizophrenic children in this sample, the structural findings have one very important psychological implication: these schizophrenic children have no organized, systematic way of viewing the world or of structuring reality.

Precisely how the normal developmental process has been interfered with is a separate issue, which again brings up the question of regression versus disorganization in schizophrenic thought.

There is no evidence in the present study to suggest a regression of the sort in which those levels of cognitive organization achieved last are lost first. If that were the case, the pattern of achievement of schizophrenic children would look much like the pattern of a normal--though younger--child. In contrast, the children in this sample often achieved later tasks, while tasks normally achieved earlier were failed.

Seriation, for example, proved to be the most difficult task for the children in this sample. Of the five tests administered, seriation was found by Piaget to be achieved second--after one-to-one correspondence. Piaget states that seriation is normally achieved before class inclusion because seriation has a

perceptual component which aids in the achievement of concrete operations. It may be that schizophrenic children, who have so often been noted as having perceptual problems, may actually be hindered by this perceptual component, rather than aided by it. This may also explain why achievement of seriation even by perceptual means was so difficult for the children in this study.

The lack of cognitive organization in the schizophrenic children in this study implies a disruption in the normal equilibrium between assimilation and accommodation. Thus, whatever the nature of the schizophrenic process, it does not allow for normal structural changes: overall, the children in this study were achieving at a much lower level than they should have been, given their age and I.Q.

This low level of achievement implies a disequilibrium, in particular, of the process of accommodation. As described earlier, accommodation is the tendency of the inner structure to adapt itself to a particular environmental event. Clearly, in these children the inner structure is not adapting appropriately to the environment. Rather, there is a predominance of assimilation. Assimilation, as Piaget (1959) has pointed out, is **normally** predominant in the symbolic play of young children:

> ...it is indispensable to his affective and intellectual equilibrium, therefore, that he have available to him an area of activity whose motivation is not adaptation to reality but, on the contraty, assimilation of reality to the self, without coercions or sanctions. Such an area is play, which transforms reality to the needs of the self. (p. 58)

However, there are two features which distinguish this normal assimilative process from "pathological" assimilation. The first is the degree to which the child is able to distinguish between reality and fantasy. This is a separate issue from whether or not the assimilation is conscious or unconscious, for, as Piaget (1962) has pointed out, "assimilation, even when rational, is usually unconscious." Rather, this is the issue Despert (1958) addressed herself to when she asked children about the reality of their play. She found that normal children could distinguish between reality and fantasy.

The second feature which distinguishes normal from pathological assimilations concerns the degree to which they interfere with the child's ability to accommodate to reality. Emotional factors play an important part here:

> ...it is therefore among the affective symbols that secondary [i.e., unconscious assimilations] will occur, and the more intense the affectivity, the more frequent will be the assimilations. (Piaget, 1962, p. 171)

As we have seen from the children inthis study, the ability to accommodate to reality in schizophrenic children has been severely interfered with.

However, neither does the pattern of achievement of these schizophrenic children suggest simply a retardation in adaptation. Some of the children were achieving at the concrete operational level on isolated tasks. Mentally retarded children, in contrast,

would have achieved more consistently at the preoperational level on all tasks (Inhelder, 1968).

I suggest that, regardless of etiological considerations, the schizophrenic process interferes with the normal developmental equilibration of accommodation and assimilation such that assimilation tends to predominate. In this way, external reality is actively modified to fit the needs of the child. The precise nature of this interference of normal development will be discussed more fully in the following discussion of the content of schizophrenic thought and its relationship to structure and affects.

The qualitative analysis of the content of the responses of schizophrenic children revealed several unusual features. These include: (1) intellect as justification, (2) suspicious responses, (3) concrete responses, and (4) emotional responses. However, the most intriguing finding of the qualitative analysis of schizophrenic thought is the relationship that exists between the content of thought on a particular task and the level of achievement of that task: Unusual responses were much more likely to be found on tasks which <u>were not</u> achieved at the concrete operational level of thought. This finding is essential to an understanding of the relationship between thought and affectivity.

I have purposely avoided the use of the words "thought disorder" in describing these responses, simply because they are not representative of the classical thought disorders described in

the literature on adult schizophrenia. I chose the term "unusual" because it implies that they are not commonly given by children the same age or younger. However, neither are they so bizarre as to be pathognomonic of schizophrenia, as, say, the assertion of an adult that he is Napolean.

I do suggest, however, that these unusual responses are similar to classical thought disorders in one very important way: that they are responses to anxiety. The ultimate source of schizophrenic anxiety is intimately tied to the question of etiology, and as such is beyond the scope of this paper. However, there are other, more immediate, sources of anxiety for the schizophrenic subjects in this sample which can be delineated.

The first and most obvious source of anxiety to the schizophrenic children in this study was that they did not know the answers to many of the question asked of them. However, implicit in this explanation is the assumption that they were aware--at least on some level--that they did not know the answer. This is a crucial difference between the responses characteristic of preoperational thought and the unusual responses of schizophrenic children. The normal preoperational child accepts the reality of his perceptions, and his conflicting statements are simply not experienced by him as conflictual. On the other hand, when a schizophrenic child gave an unusual response, it was clear that

although he did not know the appropriate operational response, neither was he able to rely solely on his perceptual apprehension of the situation.

The need of the human adult to be "rational" and to reduce cognitive conflicts has been pointed out by many authors. The psychological theory of cognitive dissonance (Festinger, 1957) was developed to explain the great lengths that people will go to appear rational:

> Basically, cognitive dissonance is a state of tension that occurs whenever an individual simultaneously holds two cognitions (ideas, attitudes, beliefs, opinions) that are psychologically inconsistent...Because the occurrence of cognitive dissonance is unpleasant, people are motivated to reduce it; this is roughly analogous to the process involved in the the induction and reduction of such drives as hunger or thirst--except that, here, the driving force is cognitive discomfort rather than physiological discomfort. To hold two ideas that contradict each other is to flirt with absurdity, and--as Albert Camus...has observed--man is a creature who spends his entire life in an attempt to convince himself that his existence is not absurd. (Aronson, 1972, p. 93)

Arieti (1975) puts the situation in even more forceful terms:

> Contrary to what is believed by some, most human beings cannot accept anything that seems irrational to them. The need for rationality is always underestimated by people who see the human being as dominated by instinctual drives. If the concept instinct is to be retained, the instinct toward rationality (including reason and rationalization) has also to be acknowledged. (p. 227)

Camus was wrong about one thing. Man does not spend his entire life in an attempt to convince himself that his existence

is not absurd. Neither, as Arieti suggests, is the need to be rational instinctual. During the preoperational phase, the child does not experience this need to be rational: the preoperational child lacks what Piaget terms logical necessity. Logic becomes perceived as necessary during the concrete operational period.

Many of the schizophrenic children in this sample were in the uncomfortable position of lacking logical explanations, while being unable to rely on their perceptions. They seemed to experience the need for logic, without the mechanism--or structure--of logic. As a result, they gave unusual responses. The dynamics of this process will become clearer through the following analysis of the unusual responses encountered in schizophrenic children.

Intellect as justification. "'Cause I'm smart" (or some variation) was given as justification to the question "How do you know?" That this question is anxiety-provoking will be obvious to anyone who has been asked that question--and not known the answer. The defensive aspects of saying "'cause I'm smart" are also obvious: it is an attempt to prevent further inquiry, while leaving the child's dignity intact.

However, "'cause I'm smart" was given as a justification on two tasks which were achieved at the concrete operational level--that is, on two tasks on which the child did know the answer. On both occasions it was given as a justification in

addition to an appropriate justification. The question remains, though: Why would this justification be less tied to the achievement of concrete operations than the others?

In fact, most of the children in this study were quite bright, and it is likely that they had been told this often. And, although "'cause I'm smart" is an inappropriate justification, it may represent the least departure from reality of any of the other unusual justifications.

Another related possibility is that those children who used this response on a task which they achieved concrete operations, may have only recently achieved that level. It may be that "'cause I'm smart" can still be tolerated as a response in addition to the logical justification because it doesn't contradict it.

Suspicious responses. The accusation that I was either cheating or using magical means to change the perceptual configuration of the material is interesting on several levels. Most of all, however, it highlights the indivisible relationship between cognition and affectivity.

The schizophrenic children who gave suspicious responses obviously perceived a change in the configuration of the testing materials, but they could not explain this change on logical grounds (i.e., "It doesn't matter how you change it, it's

always the same."). However, a suspicious response also implies that the subject experienced a conflict (and the anxiety engendered). That is, he knew enough to realize that his perceptions were conflicting: "It was the same, now it's different--that can't be." The response that I was either cheating or using magic to change the configuration is an attempt to "make sense" of these conflicting perceptions.

The use of magic as an explanatory concept is also interesting in view of the important role that magical thinking plays in the thinking of primitive people (and much younger children). It is likely that mechanisms very similar to those described above were also used by primitive peoples, and that magical thinking came about as an attempt to explain natural phenomena that were incompletely understood.

The affective component of suspicious responses varied from teasing, unconvinced remarks (e.g., "Oooooooh. You supergirl.") to more genuinely suspicious remarks, to downright conviction: "You cheated!"

Concrete responses. Arieti (1975) describes the process of "active concretization" in adult schizophrenics:

> By active concretization I mean that the psyche is still capable of conceiving the abstract but not of sustaining it because the abstract is too anxiety-provoking or too disintegrating. We must remember that the abstract ideations are not lost by the schizophrenic. If they were lost, the patient would not have schizophrenic anxiety. The abstract ideations, however, are transformed by the psychotic into concrete representations. (p. 218)

This analysis is particularly interesting in view of the fact that the present study, as well as other studies of thought in schizophrenic children, have found that schizophrenic children are capable of abstract thinking. What is characteristic of schizophrenic children is that they are not capable of abstract thinking in all situations, and that this inability is unpredictable in its occurrence.

If we accept the assumption that not knowing the correct, logical answer to a particular question is anxiety-provoking in these children, then concrete responses can be seen as an attempt to reduce this anxiety by responding in a way that is simple, literal, and familiar. This interpretation is slightly different from Arieti's: it assumes that because of the cognitive disorganization engendered by the schizophrenic process, the child may not have at his disposal, on a particular task, the appropriate logical response. The lack of an operational response makes the child anxious, and a concrete response is a way of reducing this anxiety.

Arieti, on the other hand, implies that the adult actively "chooses" (albeit on an unconscious level) to respond in a concrete manner because of the anxiety-provoking nature of the specific situation itself. The two interpretations may not be as conflicting as they seem at first glance.

For example, Subject #6 responded in a concrete manner to the following question on conservation of matter: "What if you put yours [pieces of clay] back together?" Subject #6 responded: "No, this is a bunny rabbit. What' s his name?" Subject #6 attempts, first of all, to avoid the question asked. Then he turns the clay into a bunny rabbit--a soft, non-threatening animal. Finally, in an attempt to make the situation even more concrete, non-threatening, and familiar, he aske me to give the bunny rabbit a name.

Why, however, was the situation anxiety-provoking for him? Was it because he didn't know the answer to my original question--i.e., was it because he lacked reversibility? Or was it because there was something inherently anxiety-provoking in the actual material itself--the clay--and the thought of taking it apart and putting it back together again? I suggest that the answer is "both," and I will explain this answer more fully below.

Emotional responses. The emotional responses given on class inclusion seem most clearly in response to the anxiety created by not knowing the appropriate operational response--in this case to the question, "Are there more horses or more animals?" And, because they provide an emotional, as opposed to cognitive, solution to the problem, they are the least successful of all the unusual responses in reducing anxiety.

However, these emotional responses were only encountered on class inclusion. This suggests that there is something particular to this task which elicits anxiety. This is the second source of anxiety for schizophrenic subjects, which also determines when an unusual response will be given: the testing situation and the tasks themselves.

In general, the testing situation was held constant as much as possible: the tests were administered only by the author; they were always given early in the morning; they were always given in the same room.

However, specific tasks seemed to elicit certain types of unusual responses. The main differentiating factor among the tests which influenced the occurrence of an unusual response was the degree to which conflict was aroused in the subject by factors inherent in the task itself.

Seriation, for example, did not require the experimenter to change the perceptual configuration of the test materials. Even though it was the most difficult of all the tasks for the schizophrenic children, it did not elicit any of the unusual responses given on other tasks. I suggest that the reason for this is that seriation did not present the children with a conflict, and thus the task itself aroused little anxiety. The children were asked to perform the seriation, but even when they failed, most of the subjects were unaware that they had failed.

This is why Subject # was able to say, "I did it! I did it!"--when he actually didn't. There was nothing inherent in the task of seriation to contradict his perception of his efforts as correct.

Class inclusion also did not involve a change in the perceptual configuration of the test material by the examiner. However, there was a perceptual configuration of animals present. The question "Are there more horses or more animals?" is highly conflictual if the child is unable to compare a set with its subset, and yet is also unable to accept his perception that there are more horses on the table.

In contrast with conservation of matter, one-to-one correspondence, and conservation of length, however, there was no easy way to rationalize this conflict. The child who gave an emotional response knew that horses are animals and animals are animals--what he could not do was compare them. He could not blame the experimenter for tricking him, he could not easily make the situation more concrete, he could not simply say that he's smart. He became anxious, frustrated, and angry.

One-to-one correspondence, conservation of length, and conservation of matter were the tasks most likely to elicit unusual responses--especially conservation of matter. These tasks required the experimenter to change the perceptual configuration

of the testing materials, presenting the subject with two conflicting percepts. I interpret this to mean that if the subject did not understand the significance of the transformation and could not mentally reverse the operation, and, at the same time, realized that his perceptions were conflicting, an unusual response was likely to be given.

Conservation of matter elicited by far the most unusual responses, and there are two possible reasons for this. First of all, the change in the clay was a change in the test material itself. This presented the child with a perceptually more conflicting situation than conservation of length and one-to-one correspondence--where only the relationship of the test materials to one another was changed. Second, the suggestion that we eat the clay seemed to be particularly anxiety-provoking to some of the children. A psychoanalytic interpretation of this finding might involve the hypothesis that the clay is unconsciously seen as feces, and because of unresolved oral needs characteristic of schizophrenic children, the child is made anxious by the adult's suggestion that he satisfy his (forbidden) desires to incorporate his feces.

It is again striking how intimately related are the structural and emotional aspects of a situation such as this and how incomplete one is without the other.

The third source of anxiety for the schizophrenic subjects is more difficult to define than the first two, because it is specific to the individual subject. It includes those situations which are anxiety-provoking because of the particular history of the child. One schizophrenic girl whom I observed being tested violently refused to participate in the one-to-one correspondence task. Later, I found out that one of this girl's presenting symptoms had been her belief that she was a dog. It so happened that one of the animals used in the test was a plastic dog.

While it is impossible in this study to delineate those particular situations which proved anxiety provoking to the child for personal-developmental, rather than structural, reasons, these factors should not be overlooked. For example, they might help explain why a particular child chose "'Cause I'm smart" as a justification, while another resorted to accusing the examiner of cheating.

Psychotherapy with schizophrenic children is generally aimed at discovering and helping the child deal with this third source of anxiety. While this is certainly a valid goal, it cannot resolve all of the schizophrenic child's difficulties. The structural features of his thought processes must also be taken into consideration.

Thus, several factors have emerged which influence whether or not an unusual response will be given on a particular task.

The most important factor which has emerged is structural: whether or not the child achieves the concrete operational level on a particular task. If he does not, the concept of anxiety must in addition be invoked to explain why the response was given in that particular situation and what purpose it served.

The first source of anxiety lies in the inability of the schizophrenic child on certain tasks to understand the logic of the situation and yet to be also aware that his perceptions are conflicting. He experiences conflict, and thus anxiety. To reduce this anxiety, he gives an unusual response.

The second source of anxiety to the schizophrenic child is inherent in the tasks themselves. The tasks to varying degrees present the child with conflicting perceptions, and thus produce varying degrees of anxiety which the child attempts to resolve with an unusual response.

Finally, there are personal factors which are particular to the individual child which influence when the child will give an unusual response and what kind of response he will give. All three of these sources of anxiety must be considered when analyzing the unusual responses given by the schizophrenic children in this sample.

As I mentioned earlier in this chapter, I do not consider unusual responses as classic thought disorders. However, they do have the same function: they represent an attempt on the

part of the child to reduce anxiety. I further suggest that whenever an unusual response was given, a response indicative of a classical thought disorder might have been given--had the anxiety level of the child been higher (e.g., had the tasks been less structured).

In other words, I am suggesting that the structural features of schizophrenic thought which allow for unusual responses also allow for responses indicative of more disordered thinking. However, the content of the particular response and the situation in which it is given are then determined by the level of anxiety experienced by the child. As a corollary of this, I suggest that the achievement of concrete operations acts as an inhibitory influence on disordered thinking. (This last assumption could prove to be an interesting area for further research.)

The Piagetian analysis of the structure of thought in schizophrenic children, and the described relationship between cognition and affectivity makes it easier to see why there has been so much controversy over whether a normal child's thinking is similar to adult schizophrenic thinking and why it has been so difficult to diagnose childhood schizophrenia on the basis of disordered thinking.

Before the normal child has achieved the concrete level of thought, in a sense, anything is possible. What seems true,

according to his perceptions, is true, and, even though it often conflicts with what the adult "knows" to be true, the child experiences no such conflict.

Take, for example, the generally preoperational phenomenon of an imaginary friend. The same strucutral, cognitive processes that allow the child to speak to his imaginary friend as if he were real are those cognitive processes that allowed the schizophrenic children in this sample to speak to the clay or other testing materials as if they were real. In addition, these are the same cognitive processes that might allow the child, in a more anxiety-provoking situation, to imagine that the devil was speaking to him. The differences lie in the content of the child's thought and its affective components (e.g., the degree to which the child believes in the situation).

Thus the preoperational child may be more likely to give an unusual or disordered thought, because on a cognitive level these thoughts are not as conflicting with the child's normal mode of thinking as they would be to the adult's. In order to appropriately evaluate the degree of pathology of a child's thinking, the clinician must be thoroughly familiar with the normal development of thought, and must take into account the cognitive as well as affective components of the child's specific responses.

Once the normal child reaches the concrete operational level of development, his possibilities become more limited. (This is why the latency-aged child is generally much less imaginative then the younger child.) What the child loses in possibilities, however, he gains in organization--and a whole range of isolated facts become coordinated and understandable.

The schizophrenic child of concrete operational age, on the other hand, although he may achieve the concrete operational level on isolated tasks, does not achieve this overall level of organization. Perhaps because he is older and has achieved the concrete operational level on certain tasks, the schizophrenic child may realize that there is an inconsistency in what he perceives. To reduce this inconsistency, he may give an unusual response--or perhaps a classic thought disorder.

Generally, however, investigators have found that schizophrenic children give relatively few responses indicative of classical thought disorders. This study is no exception. It is possible that the schizophrenic child, because of his generally low level of development, may not need to distort reality to the degree in which the adult does to reduce anxiety. The schizophrenic child may be quite satisfied with the explanation that the experimenter was using magic--an adult schizophrenic might have had to devise more cognitively sophisticated means to cope with his anxiety: "It's a C.I.A. plot."

In any event, the attempt of the schizophrenic child to make sense of his conflicting perceptions represents an active relationship with reality--even though it may be distorted. It is likely that the schizophrenic children who give unusual responses have a better prognosis than those who withdraw from the conflict--or never experienced it in the first place. The presence of unusual response, may, in fact, be a good sign.

CHAPTER V

SUMMARY AND RECOMMENDATIONS FOR FURTHER RESEARCH

In summary, the quantitative analysis of the structure of thought in ten hospitalized schizophrenic children between the ages of eight and ten and of average I.Q. shows that their overall level of achievement on Piagetian tasks is much lower than would be expected of normal children of their same age and I.Q. No subject achieved the concrete operational level on all tasks, and half of the subjects did not achieve the concrete operational level of any tasks.

In addition, a statistical analysis of the order of succession of achievement of the tasks reveals that the these schizophrenic children did not achieve the five tasks administered in the same order as Piaget found for normal children. In fact, no order was found: achievement on a particular task was not related to achievement on any other task--or to age.

These findings are interpreted as representing a disorganization (rather than a regression) of thought, due to a disruption in the normal developmental processes of assimilation and accomodation where assimilation tends to predominate.

The qualitative analysis of the content of thought in these schizophrenic children reveals four types of unusual responses not frequently encountered in normal children. These are categorized as: (1) intellect as justification,

(2) suspicious responses, (3) concrete responses, and (4) emotional responses. Of particular interest is the finding that these responses were much more likely to occur on tasks which were not achieved at the concrete operational level of thought than on those tasks which were achieved at the concrete operational level of thought. The relationship between the structure of thought in schizophrenic children and the content of thought in schizophrenic children is interpreted as follows:

The schizophrenic child of concrete operational age, because of the nature of the schizophrenic process, often does not achieve the concrete operational level of thought on all tasks. In addition, the schizophrenic child often cannot rely on his perceptions alone--as the normal preoperational child can. The schizophrenic child, then, is likely to experience anxiety, and this anxiety can arise from several sources. He may experience anxiety because he does not know the answer to a particular question; because the task itself presents him with a conflictual situation; because of factors specific to his individual history. In an attempt to reduce this anxiety, the child gives an unusual response.

Thus, the lack of achievement of concrete operations allows for an unusual response. In a sense, it provides the structure (or lack of it) in which an unusual response can occur.

As described earlier, at the preoperational stage of thought, anything can happen. The affective state of the child, however, determines the content of the response.

It is hypothesized that this same mechanism is at work when a response more typical of a classical adult thought disorder is given.

Implications for Treatment

If disordered thinking in childhood schizophrenia is viewed primarily as a structural disorder, as opposed to simply an affective disorder, then there are certain implications for treatment that follow. First of all, a child who has not reached the concrete operational level of intelligence--no matter how bright or how old he is--will have great difficulty making use of traditional, highly verbal forms of psychotherapy. The child simply has no way of organizing his own experiences in a coherent and meaningful way, and this includes the psychotherapeutic experience.

For these children, the method of treatment that seems most logical would be one aimed at establishing a physical relationship between the child and the external world. This approach would necessarily begin on the simplest, sensory-motor level, encouraging the child at all times to come into actual physical contact with his environment, while at the same time interpreting to the child what is happening. In

this way, the process of accomodation would be encouraged. An approach of this kind has been described by Des Lauriers (1967), and it would be most valuable to determine whether this kind of treatment could aid in the development of concrete operational thinking.

Implications for Further Research.

Several important issues concerning the structure of thought in childhood schizophrenia remain, however, unresolved. One issue concerns the generalizability of these results. Certainly many more schizophrenic children should be studied. However, it does not follow that large studies with hundreds of subjects will necessarily shed more light on schizophrenic thinking. Piaget, it must be remembered, developed his basic theory of cognitive development from the careful observation of only three "subjects"--his own children (inviting, if nothing else, criticisms of "experimenter bias"). The direction that future research in the study of thought in schizophrenic children should take is toward intensive, rather than general, studies; longitudinal, rather than cross-sectional.

It is only through intensive, longitudinal studies of thought in childhood schizophrenia that the question of disorganization versus regression will be laid to rest. Through these types of studies, it will be possible to determine the order of stages through which the child passes, and to

determine whether the order described by Piaget is truly invariant or not.

Another issue which needs to be resolved concerns the issue of the reliability of these findings. If each child in this study was retested in six months or a year's time, would his pattern of achievement and non-achievement of concrete operations remain the same?

There is some evidence to suggest that it might. Halpern's (1966) study reported two administrations of Piagetian tasks given a year apart (when the boy was 13 and 14 years old). Her findings were identical both times: he achieved the concrete operational level of the concept of dream and origin of night tasks, but not on the concept of life task. In addition, he achieved the concrete operational period of conservation of weight tasks but not on transivity of weight tasks. Her findings are significant in view of the great fluctuations that have been described on schizophrenic test (generally I.Q.) performance. If Halpern's findings can be replicated--that is, if we are measuring rather stable deficits--it will give substantial support to the assertion of this paper that the primary determining factor in disordered schizophrenic thought is structural.

Fianlly, it must be emphasized that while Piagetian theory provided the framework for an understanding of thought

in schizophrenic children, the concept of anxiety--traditionally a psychoanalytic concept--was also necessary to understand the specific responses given by the children. Peter Wolff (1960) has beautifully shown that Piagetian theory and psychoanalytic theory are quite complementary. However, much remains to be done before a fully integrated theory of psychopathology in childhood is complete--one that takes into account cognition as well as affectivity.

Childhood Schizophrenia Reconsidered

Thus, a Piagetian frame of reference has led to a type of analysis that has previously been ignored by investigators in the area of thought in childhood schizophrenia: i.e., the structure of thought. Schizophrenia in childhood is not simply a disorder of the affects, but rather a disorder which affects cognition as well--even though intelligence (as measured by traditional I.Q. tests) may be spared. It is the conclusion of this paper that the structure of thought determines whether or not disordered thinking will occur, and that affective factors intervene to determine the content of the thought.

APPENDIX A

Subjects

		Yr.	Mo.	I.Q.	
Subject #1	Date Tested:	73	1	Verbal	114
	Birthdate:	63	3	Performance	93
	Age:	9	10	Full-Scale	104
Subject #2	Date Tested:	74	1	Verbal	145
	Birthdate:	65	12	Performance	132
	Age:	8	1	Full-Scale	143
Subject #3	Date Tested:	73	2	Verbal	103
	Birthdate:	62	10	Performance	124
	Age:	10	4	Full-Scale	114
Subject #4	Date Tested:	74	1	Verbal	114
	Birthdate:	65	6	Performance	87
	Age:	8	7	Full-Scale	101
Subject #5	Date Tested:	74	1	Verbal	106
	Birthdate:	63	4	Performance	111
	Age:	10	9	Full-Scale	109
Subject #6	Date Tested:	75	8	Verbal	113
	Birthdate:	66	12	Performance	111
	Age:	8	8	Full-Scale	113
Subject #7	Date Tested:	75	8	Verbal	96
	Birthdate:	65	1	Performance	97
	Age:	10	7	Full-Scale	95
Subject #8	Date Tested:	75	9	Verbal	81
	Birthdate:	65	10	Performance	115
	Age:	9	11	Full-Scale	97
Subject #9	Date Tested:	73	1	Verbal	118
	Birthdate:	64	12	Performance	125
	Age:	8	1	Full-Scale	123
Subject #10	Date Tested:	74	1	Verbal	106
	Birthdate:	63	10	Performance	87
	Age:	10	3	Full-Scale	97

APPENDIX B

Description of the Tasks

Class Inclusion

Materials: 12 elephants, 2 horses (or any other animals).

Presentation: The experimenter asks the child to name the two animals that he has. Then, to make sure the child has some notion of the class "animals," he asks the child to name some other animals.

Part 1: The experimenter asks the child, "How many horses are there?" Then, "How many elephants are there?" Then he asks, "Are the horses animals?" "Are the elephants animals?

Part 2: (Question 1) The experimenter asks, "On this table, do we have more elephants or more animals?" "Why?"

Part 3: (Question 2) The experimenter says, "There are two children who like to put together animals. One would like to put together all the elephants, the other would like to put together all the horses. Which bunch would be greater?"

Part 4: (Question 3) The experimenter asks, "If I give you all the elephants, what remains in my bunch?" Then, "If I give you all the animals, what remains in my bunch?"

Part 5: (Question 4) The experimenter asks, "On this table, do we have more elephants or more animals?" Then, "In the world, do we have more animals or more elephants?"

Conservation of Matter

Materials: Two balls of clay (or Play Dough).

Presentation: The child is given two balls of clay of approximately the same size. First the child is asked if they are the same size. If he does not think so, he is asked to make them the same ("so we both have the same amount to eat"). When the child agrees that they are the same, he is asked, "How do you know?"

Part 1: The experimenter transforms one of the clay balls into the shape of a sausage and asks the child, "Now do we have the same amount to eat, do you have more, do I have more, or do we have the same?" The experimenter then asks, "Why?" Then the experimenter returns the balls of clay to their original shape, and repeats the same two questions.

Part 2: The experimenter transforms one of the balls into the shape of a pie and again asks, "Do we have the same amount to eat, do you have more, do I have more, or do we have the same?" The child is then asked, "Why?" The experimenter returns the pie shape back to its original form and repeats the questions.

Part 3: The experimenter takes one of the balls and breaks it into several small pieces, then spreads them apart on the table. He again asks the child, "Do we have the same to eat, do I have more, or do you have more?" Then the child is asked, "Why?" Finally, the experimenter puts the pieces back into the original shape and asks the child the same questions once more.

Conservation of Length

Materials: Two sticks of equal length (A-1 and A-2). One stick shorter than A-1 and A-2 (B). One stick shorter than B (C). Two horses.

Presentation: The experimenter asks the child to choose two sticks of the same length. The experimenter then puts the two sticks (A-1 and A-2) in a horizontal and parallel position, one directly in front of the other: ———— . Then he asks the child, "Are they the same length?" and then, "Why?" If the child does not seem to understand the concept of length, the experimenter demonstrates with the horses: "If this horse would go along this pathway, and if this horse would go along the other pathway, would one walk more than the other, or would both walk the same?" Then he is asked, "Why?"

Part 1: The experimenter says to the child, "Watch carefully what I do." He then takes one of the sticks and moves it an inch or so to the right of the other stick. The experimenter asks the child, "Are these two sticks of equal length, or is one longer than the other?" Then he asks, "How do you know?" (If the child doesn't understand, the experimenter uses the example of the horse, as above.) Then the sticks are returned to their original position, and the questions are repeated.

Part 2: The experimenter displaces the same stick used in Part 1, but this time he moves it an inch or two to the left. He then asks the child, "Are these two sticks of the same length, or is one longer than the other?" "How do you know?"

Part 3: This time the experimenter, saying, "Watch carefully what I do," moves one stick to the right and one stick to the left simultaneously. He then repeats the same questions as above. Finally, the experimenter moves both sticks to the left, and again repeats the same questions as above.

One-to-One Correspondence

Materials: 9 horses, 12 elephants (or other animals).

Presentation: The child is first asked, "How many horses are there?" Then the experimenter arranges the horses side by side (about 1/2 inch apart) in a row in front of the child. The elephants are left in disarray.

Part 1: The experimenter asks the child to "Take enough elephants for the horses. Put one elephant in front of each horse, so that we only have one elephant for each horse."

Part 2: The experimenter spreads the elephants out, but leaves the horses as they are. The configuration should look something like this:

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                .........     (horses)
. . . . . . . . . .           (elephants)
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The experimenter then asks the child, "Is there still one elephant for each horse; are there more horses, more elephants, or are there the same?" After the child answers, he is asked, "How do you know?"

Part 3: The experimenter asks the child, "If we put them as before, would we have one elephant for each horse?" After the child answers, the experimenter returns the elephants to their original position.

Part 4: The experimenter leaves the elephants in position and spreads out the horses. He again asks the child, "Is there still one elephant for each horse; are there more horses or more elephants?" After the child has answered, the experimenter asks, "How do you know?"

Seriation

Materials: 10 sticks, graduated in 5 cm steps, from about 10 cm to 15 cm in length; 1 intermediary stick; 1 screen.

Presentation: The experimenter hands the 10 graduated sticks to the child.

Part 1: The experimenter asks the child to "Make a nice staircase--place these sticks, one after another, from the biggest to the smallest." After the child has finished, the experimenter asks, "How did you choose the sticks?"

Part 2: The experimenter gives the child the intermediate stick and asks him where it should go.

Part 3: The experimenter puts up the screen and asks the child to hand him the sticks in the right order so that they will again make a nice staircase.

APPENDIX C

Scoring Criteria

Conservation of Matter

Stage 1

The identity of the two objects is not maintained when the material is transformed.

Stage 2

The child affirms conservation for some transformations, but denies it for others. The child's ideas vascillate, and he is usually vulnerable to a counter-suggestion.

Stage 3

The child is no longer bound by the perceptual characteristics of the objects. Conservation is seen as a logical necessity based on one of the following arguments:

a. identity: "It's always the same."

b. compensation: "It's longer, but it's also thinner."

c. reversibility: "If you put it back, it will be the same."

Conservation of Length

Stage 1	Two sticks are judged as equal when they are placed together; but when one stick is displaced, they are judged to be of unequal length.
Stage 2	The child vascillates in asserting whether conservation is maintained or not. He may base conservation on the extent of displacement between the sticks: when it is small he will affirm conservation, when it is large he will deny it. Sometimes when the sticks are moved simultaneously, conservation is affirmed; but when only one stick is moved, conservation is denied.
Stage 3	Child judges sticks to be equal irrespective of position. Equality is seen as a logical necessity.

One-to-One Correspondence

Stage 1

The child does not seem to understand the concept of equivalence. That is, he is unable to make the one-to-one correspondence. He may place the animals within the limits of the given configuration, without paying attention to the given correspondence.

Stage 2

The child is able to make the one-to-one correspondence, but when one row is transformed (lengthened or shortened), the perceptual features of the configuration determine the child's response. That is, the child no longer believes in the equivalance of the two rows.

Stage 3

The child is able to establish the one-to-one correspondence, and no matter how the configuration is changed perceptually, the child maintains the equivalence of the two rows--either by:

a. identity: "You didn't take any away or add any, you just moved them."

b. reversibility: "You could put them back the way they were before."

Seriation

Stage 1

Failure to make a seriation, either by

a. no spontaneous attempts to organize the sticks, or

b. constructing small juxtaposed uncoordinated series or two or three sticks.

Two or three sticks may be correctly placed, but without reference to the group of sticks as a whole. The child should be able to find the longest and the shortest sticks, but the other sticks may be placed in reference to these without order. The child may also seriate according to the top line, without taking the bottom line into account.

Stage 2

Success by groping or trial and error. The child is unable to make use of a system of relations, At this stage children usually fail to place the intermediate stick appropriately; or if they do, it is by the trial and error method as well.

Stage 3

Success by systematic method. The child will first look for the longest or the smallest stick, and then take the next smallest or longest stick, etc. The child will also be capable of spontaneously placing the intermediate stick.

Class Inclusion

Stage 1	The child is unable to correctly answer the question, "On the table, do we have more _____ or more animals?" In general, he doesn't seem to be able understand the concepts "some" and "all," and his thinking is dominated by perceptual characteristics.
Stage 2	The child will be inconsistent in his response to the questions--some he will succeed in, others he will miss. Often he will answer the question concerning the subtraction of classes correctly ("If I give you all the _____ what remains in my bunch?")
Stage 3	The child answers all the questions correctly.

REFERENCES

Anderson, R.D. A computer program for Guttman scaling with the Goodenough technique. Behavioral Science, 1966, 11 (3), 235.

Anthony, E.J. The regression of the object in the psychotic child. Proc. 2nd Int. Congr. Psychiat., 1957.

Anthony, E.J. An experimental approach to the psychopathology of childhood: autism. Brit. J. Med. Psychiat., 1958, 30, 255-269.

Arieti, S. Interpretation of schizophrenia. New York: Basic Books, 1975.

Aronson, L. The social animal. San Francisco: W.H. Freeman & Co., 1972.

Bender, L. Childhood schizophrenia: clinical study of one hundred schizophrenic children. Am. J. Orthopsychiat., 1947, 17, 40-56.

Bender, L. Schizophrenia in childhood--its recognition, description, and treatment. Am. J. Orthopsychiat., 1956, 26, 499.

Bergman, P. and Escalona, S.K. Unusual sensitivities in very young children. Psychoanal. Stud. Child, 1949, 3-4, 333-352.

Berry, J.W. and Dasen, P. Cross-cultural Piagetian research: a summary. J. of Cross-Cultural Psychol., 3 (1), 72, 23-39.

Bleuler, E. Dementia praecox, or the group of schizophrenias. New York: International Universities Press, 1950.

Cameron, N. Reasoning, regression, and communication in schizophrenia. Psychol. Monogr., 1938, 50, 34.

Cobrinik, L. and Popper, L. Developmental aspects of thought disturbances in schizophrenic children: a Rorschach study. Am. J. Orthopsychiat., 1961, 31, 170-180.

Cole, M., Gay, J. and Sharp, D.W. The cultural context of learning and thinking. New York: Basic Books, 1971.

Creak, M. Schizophrenic syndrome in childhood: report of a working party. Cerebral Palsy Bull, 1961, 3, 50.

Des Lauriers, A. and Halpern, F. Psychological tests in childhood schizophrenia. Am. J. Orthopsychiat., 1947, 17, 57-67.

Des Lauriers, A. The schizophrenic child. Arch. Gen. Psychiat., 1967, 16, 194-201.

Despert, L. A comparative study of thinking in schizophrenic children and in children of pre-school age. In L. Despert, Schizophrenia in childhood. New York: Robert Brunner, 1968, 8-36.

Despert, L. Delusional and hallucinatory experiences in childhood. In L. Despert, Schizophrenia in childhood. New York: Robert Brunner, 1968, 132.

Diagnostic and stastical manual: mental disorders, 2nd ed. Washington, D.C.: American Psychiatric Association, 1952.

Ekstein, R. Children of space and time, of action and impulse. New York: Appleton-Century-Crofts, 1966.

Festinger, L. A theory of cognitive dissonance. Stanford: Stanford University Press, 1957.

Flavell, J. The developmental psychology of Jean Piaget. Princeton, New Jersey: D. Van Nostrand Co., 1963.

Fleiss, J. Stastical methods for rates and proportions. New York: Wiley, 1973, 143-147.

Friedman, G. Conceptual thinking in schizophrenic children. Genet. Psychol. Monog., 1961, 63, 149-196.

Fuller, D.S. A schizophrenic pattern of behavior in a child with brain injury. Bull. Menninger Clin., 1954, 18, 52-58.

Furth, H. Piaget and knowledge. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969.

Goldfarb, W. Childhood schizophrenia. Cambridge, Mass: Harvard University Press, 1961.

Halpern, E. The effects of uncompatibility between perception and logic in Piaget's stage of concrete operations. Child Develpm, 1965, 36, 491-497.

Halpern, E. conceptual development in a schizophrenic boy. J. Child Psychiat., 1966, 5 (1), 66-74.

Inhelder, B. The diagnosis of reasoning in the mentally retarded. (Rev. ed.) New York: John Day, 1968.

Jastak, J. and Jastak, S. The Wide Range Achievement Test. Wilmington, Delaware: Guidance Associates, 1965.

Kanner, L. Autistic disturbances of affective contact. Nerv. Child, 1942, 2, 217-250.

Kant, E. Critique of practical reason. New York: Chicago, 1949.

Kolvin, I., Dunsted, C., Humphrey, M., and McNay, A. Brit. J. Psychiat., 1971, 118, 385-95.

Laurendeau, M. and Pinard, A. Causal thinking in the child. New York: International Universities Press, 1962.

Leitch, M. and Schaefer, S. A study of the Thematic Apperception Tests of psychotic children. Am. J. Orhtopsychiat., 1947, 17, 337-342.

Lerner, S., Bie, I. and Lehrer, P. Concrete-operational thinking in mentally ill adolescents. Merrill-Palmer Quarterly, 1972.

Levin, M. On the causation of mental symptoms. J. Ment. Sci., 1938, 82.

Mahler, M.S. On child psychosis and schizophrenia: autistic and symbiotic infantile psychoses. Psychoanal. Study. Child, 1942, 2, 217-250.

Mook, B. Causal thought in schizophrenic children. Johannesburg: Publication of the Rand Afrikaans University, 1972.

Nassefat, M. Etude qualitative sur l'evolution des operations intellectuelles. Neuchatel (Suisse): Delachaux et Niestle, 1963.

Phillips, D. and Kelly, M. Hierarchical theories of development in education and psychology. Harvard Ed. Rev., 45 (3), 1975, 373.

Piaget, J. The child's conception of the world. New York: Harcourt Brace, 1929.

Piaget, J. The child's conception of physical causality. New York: Harcourt Brace, 1930.

Piaget, J. Play, dreams and imitation in childhood. New York: W.W. Norton & Co., 1962.

Piaget, J. The early growth of logic in the child. New York: W.W. Norton & Co., 1964.

Piaget, J. The child's conception of number. New York: W.W. Norton & Co., 1965,

Piaget, J. The psychology of the child. New York: Basic Books, 1969.

Piaget, J. Genetic epistemology. New York: W.W. Norton & Co., 1970.

Piaget, J. and Inhelder, B. The child's conception of geometry. London: Routledge and Kegan Paul, 1960.

Piotrowski, Z. and Lewis, N.D.C. A case of stationary schizophrenia beginning in early childhood with remarks on certain aspects of children's Rorschach records. O. J. Child Behav., 2, 115-139.

Potter, H. Schizophrenia in children. Am. J. Psychiat., 1933, 12 (6), 1253-1270.

Rank, B. and Kaplan, S. A case of pseudo schizophrenia in a child. Am. J. Orthopsychiat., 1951, 21, 155-181.

Rapaport, D. Diagnostic psychological testing. London, England: University of London Press, 1970.

Reichard, S., Scheider, M. and Rapaport, D. The development of concept formation in children. Am. J. Orthopsychiat., 1944, 14, 156-161.

Schulman, I. Concept formation in the schizophrenic child: a study of ego development. J. Clin. Psychol., 1953, 9, 11-15.

Siegal, S. Nonparametric statistics for the behavioral sciences. New York: McGraw-Hill, 1956, 95-104.

Trunnell, T. Thought disturbances in schizophrenia: pilot study utilizing Piaget's theories. Archiv. Gen. Psychiat., 1964, 11, 126-136.

Trunnell, T. Thought disturbances in schizophrenia: replication study utilizing Piaget's theories. Archiv. Gen. Psychiat., 1965, 13, 1-18.

Vigotsky, L.S. Thought in schizophrenia. Arch. Neurol. Psychiat., 1934, 31, 1066.

Vigotsky, L.S. Thought and Language. Cambridge, Mass.: The M.I.T. Press, 1962.

Von Domarus, E. The specific laws of logic in schizophrenia. In J.S. Kasanin (Ed.), Language and thought in schizophrenia. New York: W.W. Norton & Co., 1964, 104-114.

Voyat, G. Review of Six psychological studies. B.A.Y.E.C., February, 1969.

Voyat, G. The development of operations: a theoretical and practical matter. In Piaget in the classroom. New York: Basic Gooks, 1973.

Voyat, G. Piaget systematized. New York: Teachers College Press (Columbia University), 1976, in press.

Wolff, P. The developmental psychologies of Jean Piaget nad psychoanalysis. Psychol. Issues, II, 5, 1960.