A PERCEPTUAL STUDY OF DEVIANT COGNITIVE PROCESSES IN SCHIZOPHRENIA

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David W. Merrell

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This is to certify that the

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A PERCEPTUAL STUDY OF DEVIANT COGNITIVE PROCESSES IN SCHIZOPHRENIA

By

David W. Merrell

A DISSERTATION

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

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AN ABSTRACT

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The purpose of this study was to test certain hypotheses concerning schizophrenic cognitive functioning through the use of a new perceptual task. The hypotheses grew out of the assumption that schizophrenia involves a general behavior pattern aimed at reducing the amount of stimulation to which the schizophrenic individual must respond.

A perceptual task was designed comprising ten series of stimulus events. The ten four-card sequences were presented ambiguously by projecting them on a screen out of focus. Seven of the ten series were characterized by a fourth event in the series which was so drawn as to allow either a complete change in the meaning of the sequence, a preservation of the original meaning through the four cards, an isolation of the fourth card from the first three, or an avoidance of any response to the fourth card.

The responses to this task were scored according to the conceptual schema of extensiveness of perceptual units. The extensiveness of a perceptual unit was defined as, and measured by, the number of stimulus elements from the stimulus unit included in the perceptual unit.

On the basis of the assumption concerning the schizophrenic's basic need to limit stimulus situations, the following general hypothesis was formulated: The schizophrenic process involves a relative inability of the individual to organize stimulus

values into extensive, flexible perceptual units, or conversely, a tendency of the schizophrenic individual to react to stimuli of various degrees of potential meaning by forming relatively limited, rigid perceptual units.

Two groups of subjects were used - fifty normals and fifty schizophrenics. The variables of age, education, and intelligence, as measured on the Wechsler Bellevue vocabulary scale, were controlled.

The results that were obtained suggest the following specific conclusions:

1. The perceptual units elicited in schizophrenics by stimulus events of varying degrees of complexity are more limited than those of normals: that is, they include fewer of the potential stimulus elements.
2. The perceptual units of schizophrenics are more rigid than those of normals: that is, they do not tend as often to change their responses in light of changing stimulus events.

In general, this study offers evidence to support the assertion that the cognitive disorder commonly found in schizophrenia involves a general tendency to restrict or limit the amount of stimulation to which the schizophrenic must respond, and that this is reflected in the limited number of stimulus elements in the schizophrenic perceptual unit, and in the rigidity of that unit.

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INTRODUCTION

The General Problem Area

Many investigators have concerned themselves with the disturbances in intellectual functioning which supposedly are characteristic of the schizophrenic process. For example, certain investigators have reported that when a schizophrenic patient is asked to arrange colored blocks into a pattern corresponding to a pictured pattern furnished him, he often is unable to do it with the accuracy and efficiency of a normal individual (16). Another investigator reports that when the schizophrenic is asked to complete various uncompleted casual sentences he again demonstrates a relative inability to perform the task with the logic and accuracy expected of the normal (8). In still another report one finds evidence to support the claim that the schizophrenic's responses to the Rorschach test are often crude and inferior (14). These examples of studies involving schizophrenic mental processes illustrate the wide range of intellectual behavior in which disruption of the normal processes has been reported. As shall be seen later when considering the literature in this area in detail, whether the experimental task involves verbal or performance problems, or projective devices, the schizophrenic intellectual behavior often is

found to differ in some respect from that of normals.

These differences from the normal in the way in which the schizophrenic responds to many problem solving and perceptual tasks comprise the general problem area of this study. It was the aim of this study to formulate hypotheses concerning these schizophrenic intellectual deviations which utilized concepts and terms proceding from a consistent theoretical frame of reference. The many previous studies which have dealt with schizophrenic thought and perception have utilized a wide variety of conceptual schemas. Some studies have dealt with segments of behavior labeled as thinking, reasoning or logic. Others have described the intellectual behavior they are investigating as processes of generalization or discrimination. Still other studies have classified the segments of behavior which they are investigating as perceptual phenomena, and have used a perceptual theory orientation.

Although each of these authors labels the schizophrenic "mental deficit" differently and is, indeed, often talking about different levels of complexity of behavior, each one maintains that the behavioral factor which he has defined and investigated is a general personality characteristic. Each feels that the factor he describes is generalizable to many levels of complexity of behavior, and that the factor holds the key to an understanding of schizophrenia. Thus,

one finds many studies dealing with a supposedly single, basic, underlying defect in schizophrenic mental processes, and yet this defect is given a variety of different labels and explained in terms of a variety of different conceptual schemas. Each investigator has selected concepts which best fit the type of behavior which his experimental task elicits, with little concern for the ease with which the concepts can be utilized in describing other levels of complexity of response. Since there is no consistent theoretical frame of reference within which to formulate different hypotheses, the experimental findings reflect a confused jumble of terms, labels and conceptual schemas, which makes an integration of the various findings exceedingly difficult.

For example, Goldstein (18) has utilized the concepts of "abstract" and "concrete" attitudes as a general behavioral factor underlying the schizophrenic mentality. Vigotski (43) thinks of the disorder in terms of the loss of the ability to conceptualize and in terms of the tendency to think in "complexes". Arieti (1) speaks of "Paleologic" thinking, while Cameron (8) introduces "Asyndetic Thinking", "Metonymic Distortion", and "Interpenetration". Shakow (36) has conceptualized the disturbance in terms of the inability to preserve a major set as an outgrowth of the need to establish minor sets. Werner (47), integrating his work with that of Piaget (30), believes schizophrenia involves a regressive

phenomenon demonstrated by levels of perceptual performance more in keeping with early developmental stages.

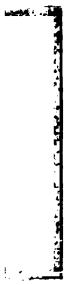
The program for this study embraced an attempt, first, to define the general problem with as few general concepts as possible and in terms of a single theoretical orientation. Secondly, the attempt was made to integrate the concepts and theoretical assumptions of the present study with those of previous studies which utilized a wide variety of differing conceptual schemas. Finally, hypotheses were formulated, and experimental tasks selected, which were broad enough in scope so as to have meaning for the general problem of schizophrenic thinking but which at the same time grew out of a specific theoretical orientation.

The next section of this introductory chapter takes up the problem of delimiting, conceptually, the area of behavior upon which this study focuses.

General Cognitive Processes

One of the greatest difficulties in dealing with schizophrenic "mental" processes arises from the lack of precise terms with which to classify the units of behavior in question.

When an author speaks of a disturbance in the ability to "abstract", or to "reason", or to "perceive", one has difficulty in deciding how much of the total range of cognitive behavior is included within those specific concepts.



It is difficult to determine whether a reference to a disturbance in the ability to abstract refers to something completely different from a perceptual disturbance referred to by someone else. The actual behavior sampled in the two studies may overlap, the studies investigating types of behavior that have many cognitive processes in common. Yet the differing concepts and the theoretical orientation utilized may leave the implication that the behavior which is sampled and the disruptive process which is found are separate, unrelated phenomena.

To a certain extent this problem in defining, conceptually, the units of schizophrenic behavior under investigation, is a part of a more general problem in psychology, for one often runs into loosely defined and overlapping terms such as perception, thinking, reasoning, and cognition. These difficulties are compounded in the writings on schizophrenia by the extensive preoccupation with such concepts as abstraction, conceptualization, and regression in thinking (18, 43, 14). For example, when one is dealing with the writings of Goldstein (16,18), Vigotski (43), or Cameron (8), one could use any of the terms "thinking", "reasoning", or "logic" to define the general behavioral area in which those authors have reported schizophrenic deviations. On the other hand, Rorschach studies such as the one by Friedman (14) usually require labels taken from a perceptual frame of reference.

Although it may appear from the use of differing concepts that the various authors are reporting on completely different types of schizophrenic mental behavior, it soon becomes apparent that each author actually is refering to a high percentage of the same general sum of cognitive processes. For example, Goldstein (18) maintains that the concrete attitude is a general personality attribute not limited to certain complex reasoning tasks, but coloring most areas of schizophrenic behavior. Vigotski (43) holds similar views in regard to the schizophrenic's use of "complex" rather than "conceptual" thinking. Likewise Piaget (30), on the basis of his work with children, uses the concept of "syncretism" to describe the general developmental state of cognitive processes found in schizophrenics and children. Syncretic thinking, as Piaget describes the concept, includes verbal, perceptual, and reasoning processes.

Thus these authors, though often bound to such limiting terms as "thought", or "perception" or "reasoning", have made it clear in the attempts to generalize their findings that each is referring to the same total range of cognitive processes, regardless of the differing conceptual schemas used in describing those processes.

In defining the segments of behavior with which the present study dealt, it immediately became clear that further differentiation was necessary from the general area of

"cognitive processes". In order to escape the ambiguity resulting from the use of such common sense terms as thinking and reasoning, this study based its concepts upon a perceptual theory orientation. This procedure had the advantage of providing consistency in the use of terms, of defining the terms in accordance with a theoretical system, and of maintaining a continuity between the complex clinical problem and other areas of experimental psychology.

However, the problem still remained of integrating the present study with previous work involving other areas of cognitive processes. If this study was to be meaningful for the general area of schizophrenic thinking, it was felt that the theoretical orientation and experimental tasks involved, must encompass that general area. To have tied the present study down to narrow concepts based primarily on a specific type of aberrant perceptual activity would have been of limited value. It would have continued the tendency, shown in past studies, to formulate special conceptual schemas for each new segment of schizophrenic intellectual behavior brought under investigation. It probably would have added still another type of schizophrenic intellectual deviation to a list of deviations already unwieldy in size. The present study attempted, instead, to proceed underthe assumption that the schizophrenic intellectual deviation was best considered a general, pervasive phenomena, not to be chopped up and given a different

label simply because somewhat different intellectual tasks were involved. The attempt was made to utilize a single theoretical frame of reference within which to integrate certain findings of the diverse studies in this area, and within which to formulate the present studie's hypotheses. As has been mentioned, a perceptual theory orientation was selected. The rational for broadening perceptual theory to include the reasoning, thinking, and general cognitive behavior included in the general research problem, has been made explicit by Wallach (44). In his exposition concerning the relation between perception and cognition (44), Wallach reduces the cognitive processes to the phenomenon of perceptual organization and the association of memory "traces" based on previous perceptual organizations. Wallach points out that perceptual organization not only implies basic structural processes, but that it includes in most cases the associated meaning of previous perceptual organizations. The perceptual reaction to a stimulus event thus is taken to include the results of previous perceptual acts which exert their influence through memory traces. Memory traces help give structure and meaning to the immediate perceptual event. Since no limit to the number or complexity of memory traces occurring as a result of a stimulus event is posited, many complex levels of cognitive functioning are included under this view of the perceptual process.

This study, then, used the perceptual process as its frame of reference, though its focus included behavior often referred to in the literature under the terms, thinking and reasoning. As we turn, in the next section, to a more detailed examination of the findings concerning the nature of the schizophrenic cognitive deviation, no attempt shall immediately be made to translate the various authors' choice of concepts into the terminology of perceptual theory. A later section will deal with the specific concepts to be used in this study and their integration with preceding work.

Specific Deviant Processes

As was mentioned earlier in this paper, the attempts to conceptualize the various patterns of deviancy in schizophrenic mental behavior have taken various courses. One of the most widely reported conceptual schemes is that of Goldstein's (4, 16, 17, 18), which holds that the significant behavioral factor in schizophrenia involves an emphasis on the concrete rather than the abstract attitude. Goldstein (17, 18), considers the "abstract-concrete" attitudes to be more than simple habits or aptitudes like memory or attention. For Goldstein, they represent a dimension of the total personality - a general capacity level. He describes the concrete attitude as "realistic": "In this attitude we are given over and bound to the immediate experience of the given

thing or situation in its particular uniqueness. Our thinking and acting are directed by the immediate claims which one particular aspect of the objects or situations in the environment makes" (18). On the other hand, in the abstract attitude ". . we transgress the immediately given specific aspect or sense impression . . . we 'abstract' from particular properties." It is a conceptual viewpoint, "be it category, a class, or a general meaning under which the particular object falls."

The handicap under which the schizophrenic functions in assuming the concrete attitude can be seen in the list of potentialities, as viewed by Goldstein, for which the abstract attitude is basic (18):

"1. To assume a mental set voluntarily.
2. To shift voluntarily from one aspect of the situation to another.
3. To keep in mind simultaneously, various aspects.
4. To grasp the essential of a given whole; to break up a given whole into parts and to isolate them voluntarily.
5. To abstract common properties; to plan ahead ideationally; to assume an attitude toward the 'mere possible'; and to think or perform symbolically.
6. To detach out ego from the outer world." (18,p.263)

Goldstein and co-workers have gathered positive evidence concerning his hypotheses in regard to the concrete attitude in schizophrenia by using such tests as the so-called stick test, the color-sorting test, the object-sorting test, and the block test using Kohs blocks (4, 16).

Hall (20) attempted to further quantify objectively scorable tests in order to assess the degree of impairment of abstraction relative to vocabulary as measured by the Wechsler Vocabulary scale. Hall tested abstraction on normal and schizophrenic subjects using seven different types of verbal and performance tests. He found a great deal of variability in the schizophrenic groups, with chronic cases showing impairment similar to that shown in organic conditions. He asserts that there is little to suggest that the degree of impairment differs between organic and deteriorated schizophrenic patients. However, he also found that early acute cases of schizophrenia with a high vocabulary level showed no apparent impairment.

Vigotski's (43) view of schizophrenic thought impairment parallels that of Goldstein. Vigotski tested the loss of the ability in schizophrenia to think conceptually, claiming that schizophrenics tend to think in complexes. These complexes consist of a whole constituted of related parts, but in which the parts are related mechanically or concretely rather than by an abstract principle as in the case of a true

concept. The schizophrenic looks upon a word as a family name for a group of objects on the basis of physical proximity, concrete similarity of certain parts, or some other non-abstract relationship.

Vigotski gives a typical example:

> ". . . the so-called chain association in patients with schizophrenia. The patient responds to a stimulus word denoting a certain object by naming another object similar in only one trait, then naming a third object chosen on account of some similarity to the second object, then in a similar fashion adding a fourth to the third, etc. The result is a number of quite heterogeneous objects very remotely connected with each other. The associative chain is built up in such a manner that there is a connection between separate links but with no single principle uniting all the links." (48, p. 1066).

Vigotski maintains that this type of "complex" rather than "conceptual" thinking is common to the child, and that schizophrenia is a truly regressive disorder. However, he does not believe in a psychogenic cause for the condition but argues for an organic basis; " . . . the intellectual disturbance as well as the disturbance in the fields of perception, emotions, and other psychologic functions are in direct casual relationship with the disturbance of the function of formation of concepts." Thus, Vigotski too believes that his findings represent a basic variable associated with schizophrenia.

In attempting to establish experimentally just what level of psychological processes is affected in schizophrenia,

Shakow (36) and his co-workers (37, 38, 40) experimented with various degrees of complexity of response. They found that simple noncentral processes, where volition is at a minimum are least or not at all affected. These include certain autonomic functions, such as galvanic skin response, and such simple functions as patellar reflex latency time (22) and direct current threshold (21) and some aspects of motor response (38, 39). The levels of response which were found to be affected, Shakow regards as an expression of a single difficulty, that is, "the inability to keep a major set" (37). Shakow feels that the schizophrenic individual is forced into withdrawal, oversimplified and unsuccessful modes of response because of this lack of an "appropriate and consistent readiness to respond to a certain specific stimulus or a generalization drawn from a group of stimuli." This lack of a major set may, Shakow believes, actually be the expression of the schizophrenic's need to establish minor sets: The need "to segmentalize both the external and the internal environments." (38)

This need for segmentalization is seen as the result of the attempt to satisfy infantile needs within a structure that has automatically attained physical and intellectual maturity.

Cameron (8) adds three more concepts involving schizophrenic thinking on the basis of his study of schizophrenic

logic, using uncompleted causal sentences. The first of these "asyndtic thinking," is defined much as Vigotski's "complexes," that is, a loose cluster of terms instead of organized concepts. They are marked by a paucity of genuinely causal links with the terms being thrown together by very arbitrary sorts of relationships. Cameron, however, does not consider this type of thinking childlike or regressive, pointing out that it does not possess the "global schema" which Piaget (30) maintains marks the "syncretic" thinking of children.

"Metonymic distortion" is Cameron's term for the approximate but related term which schizophrenic substitutes for the more precise definitive term normals would use. This, according to Cameron, has no childhood counter-part and is a species of disorganization rather than a reduction to a lower level.

Cameron gives the label "Interpenetration" to the third, and again unchildlike, type of thinking he found in his responses by schizophrenic subjects. As it is described by Cameron, "in its well-developed form it consists of the interpenetration of the elements or fragments of different themes, sometimes of a theme and a counter theme, -- in our material the one concerned primarily with the immediate problem that we have introduced from the outside-- and the other, deriving from persistent preoccupations of a personal nature." (8)

Arieti (1) chooses to classify schizophrenic thinking as "Paleologic" rather than "Aristolelian" and, as the term implies, characterizes it as primitive and archaic. In paleological thinking, the individual accepts things as identical on the basis of some common element between them. Whereas the normal person accepts identity only upon the basis of identical subjects, the paleogician accepts identity based upon identical predicates. An example of this is offered by Arieti in which, " . . . a schizophrenic patient thinks without knowing why, that the doctor in charge of the ward is her father and the other patients are her sisters. A common predicate -- a man in authority -- leads to the identity between the father and the physician. Another common predicate--females in the same position of dependency -- leads the patient to consider herself and the other inmates as sisters."

Piaget's (30) extensive work with children has led him to place the thinking of schizophrenics mid-way between that of the pre-adolescent child and the adult. Piaget describes children's thinking in terms of verbal, perceptual, and reasoning "syncretism." In syncretic thinking things are associated as wholes. The wholes are held together by a schema evolving certain elements of the whole, not by a logical analysis of the elements of the wholes. It falls between pre-logical and logical mechanism, being "not so

absurd nor so deeply affective in character as in dreams or autistic imaginings." He points out that in syncretistic understanding, the whole is understood before the parts are analysed, and that the understanding of the parts becomes a function, often wrongly, of the general schema. The schema of understanding rests only on a few points which have been spontaneously related.

Paiget describes verbal syncretism as follows:

> "Now this is the method used by the child. He lets all the difficult words in a given phrase slip by, then he connects the familiar words into a general schema, which subsequently enables him to interpret the words not originally understood. This syncretistic method may, of course, give rise to considerable mistakes . . . , but we believe it to be the most economical in the long run, and one which eventually leads the child to an accurate understanding of things by a gradual process of approximation and selection." (30, p. 152)

Werner (47) has incorporated many of these views in his theory concerning the developmental stages in perception, and views schizophrenic perception as a regression to earlier developmental levels. Friedman (14) attempted to test Werner's hypotheses by scoring schizophrenic, normal, and children's Rorschach protocols according to a scoring system based on Werner's developmental perceptual stages. He concludes that schizophrenics, as a group, do exhibit regression in the structural aspects of their perceptual functioning. Friedman points out that with schizophrenics, "like children, and unlike

adults, their perceptual functioning is predominatly of a global diffuse, syncretic, rigid, and labile nature, and marked by relative lack of differentiation and hierarchic integration" (14). However, he found that this regression was not total: there remained vestiges of the higher developmental level of functioning.

The evidence on schizophrenic perception, based on the Rorshach test, from investigations by Rorschach (34), Dimmick (10), Rickers - Ovsiankina (32), Beck (2), Klopfer and Kelly (25), Rapaport (31) and Johnson and Sherman (23), yields certain consistencies in the findings. In general, there is an increase in the number of Unusual Detail responses which are beyond normal expectancy. The nature of the Whole response is primarily of some inferior, vague, crude quality. And, of course, confabulations and contaminations are prevalent, and preservation common. Beck finds no accentuation of the number of Whole responses.

Garmezy (15) tested a further hypothesis concerning schizophrenic perception, basing his work on the assumption that the highly-generalized withdrawal of schizophrenic patients represents an inability to differentiate among environmental stimuli. He hypothesized that schizophrenics would find it more difficult than would normals to differentiate between stimuli along a given dimension. The author used tones of varying frequency as his stimulus dimension and

added a second procedure in which he rewarded correct differentiations and punished incorrect ones. His first hypothesis was not upheld, for the schizophrenic group was able to differentiate the stimulus tones as well as the normals. However, he found that when he added punishment to the procedure, the schizophrenic group's performance deteriorated significantly. Perhaps the most important observation of Garmezy's was that, "learning curve data indicated that, under threat of punishment, avoidance responses to all stimuli came to dominate the behavior of the schizophrenic patients, over-shadowing and negating previously effective rewards."

Finally a study by Wegrocki (46) continues the "abstract-conceptual" frame of reference by hypothesizing that schizophrenic thought involves a disturbance in the a bility to generalize. Wegrocki gave children and schizophrenics three tests of generalizing ability -- Proverb interpretation, Van Wagonen Graded Analogies, and Essential Differences. He concludes that some, but not all schizophrenics tend to manifest a disorder in the function of generalization; that paranoids show the least disturbance and hebephrenics the most; and that in comparison with children, the disorder does not appear to be regressive, for there are many qualitative differences between the productions of children and those of schizophrenics.

The foregoing studies indicate that the schizophrenic individual differs from the normal over a wide range of intellectual behavior. Whether the problem posed is one involving ambiguous visual stimuli (14) or complex verbal problems (46), the schizophrenic shows a general disability in his attempts to react adequately to experimental stimulus situations. This disability has been given various labels depending on whether the author has chosen to use concepts involving more general intellectual processes (18, 43, 46), or concepts derived from a perceptual frame of reference (47, 14). We can speak of the disability as a disturbance in the processes involving abstraction, conceptualization, generalization, logic, set, or perceptual organizations. But regardless of the label used and the type of problem situation from which it derives its orientation, it would seem promising to assume that one general intellectual disability is involved. This assumption is supported by Goldstein (18), Shakow (37), Vigotski (43), and Werner (47), all of whom emphasize the extensiveness of the reasoning or perceiving deviancy in question rather than limiting its applicability to the specific problem situations utilized in their respective studies. The assumption is also supported by the fact that the many concepts listed above, all of which refer to areas of deviancy in schizophrenia, pretty much cover the area of behavior loosely designated as "thinking", "intellectual behavior" or "cognitive processes".

Experimental Tasks

In describing the area of interest of this study we have now considered the general clinical problem, the general cognitive functions involved, and the concepts by which the specific deviant processes have been defined and investigated in previous studies. It also has been stated that this study utilized perceptual theory as a frame of reference within which to define concepts referring to the wide range of cognitive processes under consideration. However, in using perceptual concepts in the organization of the material, that is, in using perceptual units of behavior as the segments of behavior under scrutiny, it still became necessary to consider the level of complexity of perceptual response with which we were to deal. As was seen in the preceding section, studies on schizophrenic thinking have focused their attention on a wide range of complexity of cognitive response. Each investigator has selected a label for the specific process with which he dealt with little thought for a unifying theoretical orientation. The units of behavior used in the specific studies varied from the response to tones of different frequencies (15) to the response to complex verbal and performance tests of abstraction (20). The experimental task or stimulus problem used in each study has of necessity been closely related to the specific conceptualization of the intellectual process upon which each study focused.

However, in using a perceptual frame of reference in this study, it was felt that the problems involved in using different concepts for different levels of complexity of a task have been avoided. The concept of perceptual organization involves many degrees of complexity of response (44), so that different tasks do not require entirely different concepts. We simply deal with the organizational factors involved in each perceptual act. Thus, in studies with a perceptual orientation, we may be dealing with simple perceptual tasks in which the structural elements of the stimulus provide most of the basis for the organization. These studies include the basic works of Gestalt theory, and such perceptual studies as the one by Wever (48) on figure-ground. Also to be included here would be such studies as the ones by Bridgen (5), Smith (40), and Douglas (11) who investigated basic perceptual principles by the use of tachistoscopic presentation of visual stimuli.

At a more complex level of response, certain studies deal with general perceptual organizations which are more dependent upon the internal state of the organism. These studies stress the influence of previous perceptual response, or memory traces (44), upon the immediate perceptual act. They include in the perceptual organization the influences of memory traces from many complex past events. Many studies of complex cognitive phenomena fall in this category. For

example, there is the study by Bruner and Goodman (6) concerning the effect of economic level on the perception of coin size in children, and the study by Levine, Chein, and Murphy (28) which showed how hunger in students can affect their perception of ambiguous stimuli. Also one can include the study by Schafer and Murphy (35) in which they demonstrated the influence of previous learning on the perception of a shifting figure-ground stimulus. Finally, the studies by Murray (29) and Lueba and Lucas (27), which showed the effect of mood upon the content of a perceptual event, can be placed in this category.

Studies within the perceptual theory fame of reference also often deal with very complex levels of perceptual organization. Studies utilizing projective techniques are examples of this. When we considered basic perceptual studies we were dealing with perceptual organizations of simple stimulus events in which the structural aspects of perception were stressed. At the level of complexity next considered, certain internal functional factors were measured or controlled and the effect of their inclusion in the perceptual organization was investigated. When we now consider projective techniques we are dealing with studies in which the stimulus material is complex and a wide range of unmeasured internal factors are considered. In perceptual terms, the many and varied memory trace associations that go into the perceptual organization of the

stimulus material are not experimentally controlled. Thus, these studies are most used in the clinical investigation of individual differences, rather than in experimental validation of laws of perception.

As has been seen, investigators utilizing a perceptual theory frame of reference have attacked many levels of complexity of cognitive response within a single theoretical orientation. As a result of that fact, it became the intention of this study to investigate schizophrenic cognitive functioning, utilizing a perceptual theory orientation, and utilizing a perceptual task which involved several degrees of complexity of perceptual organizations. It was the intent of this study to utilize tasks which had some bearing on past studies done on schizophrenic "thought", "reasoning", and "logic"; and which, at the same time, proceded from a single, consistent theoretical orientation.

Theoretical Assumptions and Specific Concepts Involved in the Present Study

A final consideration in introducing the problem posed in this investigation concerns the nature of the specific conceptual schema and the theoretical assumptions on which the study is based. As has been stated the theoretical orientation is broadly perceptual in nature. The units of behavior under investigation have simply been labeled "perceptual units", and their identification is based on

the stimulus units and the responses that they evoke. A later section will deal with the method by which the continuous perceptual process is arbitrarily broken up into specific "perceptual units" based on the experimental stimulus units.

The perceptual unit, then, is simply that segment of the perceptual process which can be related to specific stimulus units. The organization of perceptual units has been investigated in this study in regard to two factors; their extensiveness, and their rigidity. The extensiveness of a perceptual unit refers to the number of stimulus elements included in that perceptual unit. The rigidity or flexibility of a perceptual unit refers to the tendency to limit or extend the perceptual unit in the face of an increase in the extent of a stimulus unit.

The focus of this study upon the "extensiveness" of a perceptual unit parallels Korzybski's concern with the abstracting process which accompanies all perception. Korzybski (26) has pointed out that all perceptual processes involve an "abstracting out" by our nervous system of only a part of the potential stimulus values present. The language forms and symbols that come to take the place of perceptual events actually refer to only certain elements of those events. Our perception of the world, of each environmental event, is an abstraction of those events and includes only

certain of the possible elements of the events. Korzybski makes this point in his discussion of the relationship between language and perception (26), but it is particularly pertinent to this study concerning schizophrenia. For the studies on schizophrenic thought and perception all seem to point toward a deficit, perhaps volitional, in this basic process of perceptual abstraction at most levels of complexity. The various works can be reconsidered as implying the notion that there is a relative paucity of stimulus elements in the schizophrenic's perceptual responses. For instance, Goldstein's (18) characterizations of concrete thinking in which he states, "our thinking and acting are directed by the immediate claim which <u>one particular aspect</u>[1] of the objects or situations in the environment makes", lends itself immediately to this more general concept. Less extensive or limited perceptual units are those in which only a few obvious stimulus elements are utilized. Vigotski's complexes (43) are responses to groups of objects in which the response embraces only one or a few of the available stimulus elements among the group so as to arrive at a collection of stimulus units, rather than to respond to the many potential cues to higher concept formation in the form of subtle stimulus elements.

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[1]Underlined by the author.

Shakow's "lack of readiness to respond to a specific stimulus or a generalization" (36), is to a certain degree an exact, passive counterpart to the assertion that schizophrenic thought represents a need to limit perceptual response. The result is the same, namely, the omission in the perceptual unit of certain stimulus elements, either by intending to omit them or through an absence of the need to include them.

The syncretic thinking described by Piaget (30) represents an organization of percepts according to a global schema, resting on a few points which have been spontaneously related. Again we can see that the principle of limited perceptual units underlies what in this case is called syncretism, and which, where it refers to children, implies an unfamiliarity with more extensive and subtle stimulus elements, leaving limited perceptual units out of necessity.

The evidence from Rorschach studies, as has been pointed out earlier, shows clearly the vagueness,ie., absence of pertinence to all the stimulus elements, of the Whole response. Garmezy's (15) findings, that punishment of schizophrenic's "incorrect differentiation" responses leads to stimulus avoidance, suggests that the tendency to omit stimulus elements from perceptual units may vary with the circumstance of the response and the complexity of the task. When the task only involved tones as stimulus elements, the avoidance or "limitation" was not present.

Finally, it would seem possible to include Wegrocki's "inability to generalize" within the broader conceptual schema of limited perceptual units, since generalization manifestly implies the ability to associate more and more stimulus elements with the response unit.

Thus, it is the basic assertion of this study that the peculiar intellectual processes of the schizophrenic reflect this basic need to reduce the extensity of the stimulus values to which he must respond. This conceptualization of the problem brings together the limited area of schizophrenic thought and the more general behavioral observations concerning schizophrenia (7,3), namely, the tendency toward withdrawal, the flattening of affective interchange with the environment, and the estrangement from reality. All of these also reflect the lack of "contact" between the schizophrenic and stimulating situations, or in terms utilized in this study, they all may reflect, or may be the result of, the limitations of the schizophrenic's perceptual units.

More specifically, the major assertion of this study can be narrowed to the following statement: The schizophrenic process involves a relative inability of the individual to organize stimulus values into extensive, flexible, perceptual units, or conversely, a tendency of the schizophrenic individual to react to stimuli of various degrees of potential meaning by forming relatively limited, rigid perceptual units.

By "limited perceptual units" we have already seen that units composed of relatively fewer stimulus elements is meant. "Rigid perceptual units" refers to the same underlying proposition, but in this case the prejudice against new, or more, stimulus elements is reflected in the tendency to cling to "old" elements once they are included in a perceptual unit.

The term stimulus unit refers to any division of the stimulus complex present and potentially perceivable to an individual. The stimulus unit may get its boundaries from structural factors, such as the make-up of a picture, to which an individual is asked to attend, from time factors, as when sequences of events of variors lengths are present, or by any arbitrary selection of convenient stimulus characteristics. Considering perception to always involve a process of abstraction removes any idea of absolute boundaries from the concept of "stimuli". The process of perception gives stimuli their limits or meanings. One can only select stimulus units arbitrarily and investigate the corresponding perceptual unit.

Hypotheses

The general hypothesis of this study is that the schizophrenic process involves a general tendency to limit responsiveness, including basic perceptual responses, to stimulus

situations.[1] This tendency is revealed in the limited nature of the schizophrenic's response to stimulus situations as measured by the relative paucity of stimulus elements in his corresponding perceptual units. The tendency is also revealed in the schizophrenic's attempts to isolate extensive, related stimulus situations into separate perceptual units. It is further revealed in the schizophrenic's tendency to avoid changing a perceptual unit. He is relatively unable to substitute a new stimulus element for existing elements which have proven to be inaccurate. Specifically, the hypotheses can be put into the following form for experimental testing:

1. The perceptual units of schizophrenic individuals will contain fewer stimulus elements from the corresponding stimulus unit than will the perceptual units of normals.

This hypothesis asserts that the limited responsiveness to stimulation of schizophrenics will show itself in the simple perceptual response to stimulus events. The schizophrenic's perceptual responses will contain quantitatively fewer elements of the stimulus situation than those of normals. The concreteness, lack of concept formation, or "syncretism" of schizophrenics is seen as this limiting of response to as few stimulus values as possible, as it occurrs in the cognitive processes.

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[1]This refers only to externally imposed stimuli.

2. When a stimulus unit is extended to include additional stimulus elements, the schizophrenic group will tend more often than the normal group to isolate the additional stimulus elements into a separate perceptual unit, rather than to form a more extensive one.

Individual stimulus events occur in a context of broader stimulus conditions, and more important, in sequence with events coming before and after which help give them their meaning. This hypothesis asserts that the schizophrenic, in limiting his response to stimulation, often ignores those stimulus elements linking one event with another. He establishes separate perceptual units where a more extensive perceptual response would have related all elements into one perceputal unit. Thus, the segmentalization and compartmentalization found in schizophrenic thinking can also be related to the tendency to limit the amount of stimulation to which the schizophrenic will respond.

3. The schizophrenic group will tend less often than the normal group to reorganize a perceputal unit so as to substitute new, potentially more accurate stimulus units.

In a situation in which the perception of an event or sequence of events can be altered in light of new events, the

schizophrenic group will be relatively unable to produce the reorganization. This rigidity in the perceptual process is seen as an escape from the necessity of considering new stimulus elements - of substituting new elements for old in an existing perceptual unit. Thus, the limited, inaccurate, and often bizarre explanations that the schizophrenic has for events can be seen as arising, in part, from his failure to take all the elements of a stimulus situation into account, particularly when the events unfold sequentially and new events place the burden upon him of changing old perceptual units. This failure to take additional stimulus elements into account is a logical extension of the tendency to limit the response in any stimulus situation.

METHODOLOGY

The Stimulus Material

The stimulus material for this study consisted of ten series of pictures which were projected on a screen. Each series was made up of four pictures, shown one at a time. The items depicted were individuals, animals or objects which taken together portrayed some event, and each four-card series portrayed a different event. Thus, each series presented complex stimulus units which could be organized into perceptual units of various degrees of extensiveness. To this end, the following conditions prevailed:

1. Each picture represented some object.
2. Each picture provided cues for activity or movement involving the object.
3. Each four-card series provided cues for organizing each series of pictures into a single total event involving both the object and its activity.
4. Seven series of pictures were so designed and so presented as to allow the possibility of reorganizing the perceptual unit.

The latter was accomplished in the following manner:

1. The pictures were presented ambiguously (out of focus) so that the subjects were not always positive that their percepts were accurate.
2. The pictures were so designed that each one provided cues for at least two different objects and two different events.
3. The first three pictures in the series looked more like one set of objects or one event, and the fourth picture looked more like a unit or object of an alternate event.

The subjects who attended to each stimulus element in succession could reorganize their four-card perceptual unit on the basis of the new cues in the fourth card.

Thus, the tasks imposed problems in perceptual organization similar to those faced by schizophrenic and normal individuals in life situations. They were required to respond to complex, often ambiguous sequences of meaningful events, and they often faced the problem of either reorganizing their perception of events in the light of new events or letting the original, possibly inaccurate perceptual units stand.

The stimulus material was designed and drawn by the author, photographed from the original drawings and mounted on cardboard. The final stimulus cards measured 4 3/8 inches by 4 7/8 inches.

The ten series with their content and objective organization were as follows:

I. "Ice Cream" -- This series has three events picturing an ice cream cone melting and falling over. The final picture, though similar in design, shows a man landing with a parachute, the chute just beginning to collapse. Thus, the whole sequence can be reorganized in terms of a descending and collapsing parachute.

II. "Candle" -- This series does not incorporate a changed event but shows a candle at various states of burning down.

The three series which do not contain changes in the last event were included primarily to guard against the subject's getting "wise" to the slipping in of different events in the sequence and assuming that all the final events were different.

III. "Whale" -- In the first three events this sequence pictures a spouting whale gradually submerging. The final event shows a "whale-like" sailboat, sinking.

IV. "Pipe" -- Three pictures of a pipe "blowing" a soap bubble which gets bigger and bursts. The fourth event is of a little boy with an Indian feather tied to his head (to look like the pipe stem), with the remains of a burst bubble gum bubble around his mouth.

V. "Dog" -- This is another homogeneous sequence showing a dog walking along, smelling a bone, stopping to dig

it up -- and finally walking along with the bone in its mouth.

VI. "Tree" -- The first three events in this sequence could either be organized as a tree growing up, or as a tree which one is approaching. The final event shows an atom bomb blast in full stage of development. Because of its cloud-like appearance, the reorganization could also be in terms of a rain storm developing.

VII. "Thief" -- The first three events picture a thief being pursued by a policeman. The last event shows a baseball player being tagged out in a run-down between bases.

VIII. "Diver" -- This is another uninterrupted four-event sequence, showing a diver in various stages of performing a dive.

IX. "Leaves" -- The first three events of this sequence picture a tree gradually losing its foliage. The last event is of a boy undressing.

X. "Dance" -- The final series of pictures shows two people meeting and beginning to dance. The last picture shows them boxing.

The selection of the particular objects and events pictured in each sequence was conditioned mainly by the ease with which they could be represented as alternative organizations. An effort was made, however, to include a wide range of objects and events, ranging from inanimate through human content and physical through social events.

Instructions

After seating the subject, the following instructions were given in every case:

"I have some pictures to show you on the screen. They are going to be out of focus or blurred, and what I want you to do is to tell me exactly what you see even though they are hard to make out. First of all, I'll show you four pictures. The first one will be very blurred, but the second will be clearer than the first, and the third will be clearer than the second, and so forth. Thus, you'll get a better look at the pictures as we go along. You'll see each picture for only five seconds. After you've looked at the picture, tell me everything you saw."

After presentation of the third picture in the series, the experimenter asked:

"Now tell me what the three pictures you've seen have been."

After presentation of the fourth picture in the series, the experimenter asked:

"Now tell me what the four pictures you've seen have been."

These questions were necessary to elicit the organizational and reorganizational factors involving the past events in the series. Often the subject incorporated them voluntarily in

his response to the last presented card, and questions then were not needed.

After the first series of four were presented and the responses recorded by the experimenter, he stated:

"Now here are four more pictures. We'll do these the same way as the others." The questions after the third and fourth card then proceded again as indicated above.

Equipment

The room used in the study was an observation room included in the Psychological Services section of an N. P. hospital.[2] The room was without outside windows and could be made perfectly dark. A 22 x 30 inch white canvas screen was placed at one end of the room on a stand, its bottom edge coming 36 inches from the floor. The projector was located 8.5 feet from the screen, resting on a table that was 30 inches high. The subject sat to the left of the projector, 9.5 feet from the screen, sitting on an individual round-backed chair.

A Balopticon projector was used. It has two lens systems, one for regular slide projection and one for opaque projection. Activation of a lever on the side of the projector instantly switched the beam of light from one lens system to the other. A shift from slide projection to opaque projection resulted in a shift from a blank, brightly lighted screen to the dimmer

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[2]Veterans Administration Hospital, Tomah, Wisconsin.

reflected image of the opaque material. The lens focus for opaque projection was effected by adjusting the length of the lens barrel. Under present conditions complete "out of focus" was represented by 0. 0 cm. of extension of the lens barrel, while good focus occurred at 6.5 cm. or complete extension of the lens barrel. A scale graduated in millimeters was mounted on the lens barrel so that focus could be precisely controlled.

Since the room was completely "blacked out", and it was necessary to record responses and read and set the lens focus, a white bulb of the small Christmas tree variety was mounted just to the rear of the lens barrel over the graduated scale.

Focal Lengths

This study utilized degrees of focus to introduce ambiguity in the stimulus. It was necessary to find the degree of ambiguity which would allow for the organization of the stimulus events into a sequence, and still provide enough ambiguity so that reorganization could occur when a different event was introduced into a sequence. As can be seen, a reorganization usually demanded a denial of the earlier "correct perception both as to content of the discrete events and their organization.

Working with six prliminary subjects, two normals and four schizophrenics, various degrees of "in-focus" were

investigated. The focal lengths (extension of the lens barrell in cm.) that were found to allow organization of the series in terms of one event, but that also allowed reorganization of the series in terms of the alternate event, are listed in Table I. These points represented an area where ambiguity was present but where also some meaning was present. On each successive card in each sequence, the extension of the lens barrel was increased by .5 cm. This was done to present less ambiguity in the final, changed event.

Exposure Time

A period of five seconds was arbitarily selected as offering the subject sufficient time to perceive the picture and as being short enough to force an immediate judgment as to the content of the picture. Since the focal points were being used to establish ambiguity, exposure time was not utilized for that purpose as it is in tachistoscopic studies (33, 13, 9, 24, 42). Douglas (11) reports from her study and others (5, 40, 48), that exposures of over two seconds seldom result in any further increase in accuracy of perception. The results contained in these tachistoscopic studies would indicate that a five second time interval is sufficiently long to eliminate exposure time as a factor influencing the accuracy of the perception of the pictures. The five second

TABLE I

DEGREE OF FOCUS FOR EACH PICTURE

Series I	Series II	Series III
Card 1 - 2.5 cm.	Card 1 - 3.5 cm.	Card 1 - 0.0 cm.
Card 2 - 3.0 "	Card 2 - 4.0 "	Card 2 - .5 "
Card 3 - 3.5 "	Card 3 - 4.5 "	Card 3 - 1.5 "
Card 4 - 4.0 "	Card 4 - 5.0 "	Card 4 - 2.0 "

Series IV	Series V	Series VI
Card 1 - 2.5 cm.	Card 1 - 3.5 cm.	Card 1 - 0.5 cm.
Card 2 - 3.0 "	Card 2 - 4.0 "	Card 2 - 1.5 "
Card 3 - 3.5 "	Card 3 - 4.5 "	Card 3 - 2.0 "
Card 4 - 4.0 "	Card 4 - 5.0 "	Card 4 - 2.5 "

Series VII	Series VIII	Series IX
Card 1 - 3.5 cm.	Card 1 - 1.5 cm.	Card 1 - 1.5 cm.
Card 2 - 4.0 "	Card 2 - 2.0 "	Card 2 - 2.0 "
Card 3 - 4.5 "	Card 3 - 2.5 "	Card 3 - 2.5 "
Card 4 - 5.0 "	Card 4 - 3.0 "	Card 4 - 5.0 "

Series X
Card 1 - 1.5 cm.
Card 2 - 2.0 "
Card 3 - 2.5 "
Card 4 - 3.0 "

time intervals were measured by a stop watch. It was possible to place each card in position while the beam of light was being projected through the slide projection system. The card could then be exposed simply by flipping up the lever, and the exposure could be terminated by a downward flip of the lever.

Subjects

The subjects of this study included two main groups -- normals and schizophrenic patients. The normal sample was drawn from the employee population at the hospital and included 50 subjects. The schizophrenic group also was composed of 50 subjects, all patients at the hospital. All subjects were males. The diagnoses for the patient sample were based on the present hospital diagnosis of each patient. In terms of the mean and standard deviation, the two groups were closely matched for age, education (year of highest grade attained) and intelligence. As Table II indicates, all three differences between the means were extremely small and statistically insignificant. The device used to measure intellectual level was the vocabulary sub-test of the Wechsler Bellevue intelligence scale (45). This sub-test, according to Wechsler (45), correlates highly with the total scale (eta; .85).

The testing period, including the administration of the vocabulary test, required about one hour of the subject's time.

The whole procedure was accomplished in one sitting, eliminating the necessity for return-sessions.

TABLE II

MATCHING OF THE TWO GROUPS

Group	Age		Education		Vocabulary	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Normal	34.74	5.26	10.20	1.93	24.00	5.92
Schizophrenic	34.16	7.28	10.14	2.52	22.43	6.92
t.	.003		.143		1.296	

In general, the patient-group was investigated under conditions similar to those in the usual diagnostic testing programs, and the patients were given the impression that these procedures were part of the usual routine testing. This was done to avoid unduly disturbing paranoid patients or other patients susceptible to delusions and ideas of reference.

The normal group was told that the procedure was part of a research project, and their cooperation solicited on that basis. It was possible to arrange it so that the experimental sessions occurred during working hours at the hospital rather than on their free time. This acted as a positive factor in securing complete cooperation. After the procedure was completed with each normal subject, the examiner

answered any questions the subject had about the study. The subjects were always curious about the actual content of the cards, and it seemed desirable to show them the cards in focus after they had completed the experiment. The subjects were requested to cooperate in terms of not discussing the experiment with other employees.

Treatment of Data

As we have indicated, the stimulus material and experimental procedure involved in this study were designed to yield data concerning the perceptual organization and reorganization of stimulus sequences. In treating these data, we shall be dealing with five principal response classes. The first of these is "organization," the extensiveness of the perceptual unit reported by the subject. Organization involves the number of stimulus elements found in a perceptual unit. The other response classes we have labeled "reorganization," "constancy," "isolation," and "indecision."

These response classes simply represent the four possible alternatives available to the subject when presented with a fourth card which breakes the sequence. They bear upon the hypothesis dealing with the schizophrenic's tendency to break stimulus sequences up into separate perceptual units and the hypthesis that the schizophrenic will tend to avoid reorganizing existing perceptual units. What each alternative specifically involves is as follows:

Reorganization: The subect changes the existing perceptual unit so as to make it agree with his perception of a new, apparently different stimulus unit which terminates the sequence.

Constancy: The subject perceives the new potentially different stimulus unit as an integral part of the existing organization of the sequence.

Isolation: The subject isolates the new stimulus unit from the existing structure, thus forming a separate perceptual unit.

Indecision. The subject is unable to respond adequately to the new stimulus unit which is ambiguous in the sequence of stimulus events.

The identification of the five response classes proceeded as follows:

Organization: The measurement of the organization of immediate stimulus complexes into meaningful perceptual units, and the organization of sequences of stimulus situations into broader perceptual units embracing spans of time of various durations, both require a definition of the organizational process which allows objective quantification of that process. Organization has been defined for the purposes of this study as the relating together of two or more stimulus units, thus providing a larger perceptual unit. This definition allows us to use certain

guide-posts for the purpose of quantification. For instance, in responding to a stimulus complex an individual might label it as a group of lines or geometric figures. Another individual perceiving the same stimulus might label it a dog. And a third person might glance at the stimulus material and immediately respond that it's a dog walking along with a bone in its mouth. Now assuming, appropriately enough to most important stimulus situations, that the stimulus complex possesses a certain optimum objective meaning as defined by social agreement, then we can immediately see that these three individuals have "organized" the stimulus unit into perceptual units of varying degrees of extensiveness. In accordance with our definition of perceptual organization, the individuals have included in their respective perceptual units different amounts or a different number of the available elements of the stimulus complex. The individual whose resonse to the stimulus unit only involved gross recognition of form articulation obviously did not respond to the more detailed stimulus elements making the form recognizable as a dog. Further, the individual who did respond to the stimulus by recognizing it as a dog, though including many stimulus elements involving shape and relationship, did not respond to those elements giving cues to activity and movement. Thus, the third individual, in saying that the stimulus looks like a dog walking along carrying a bone, has responded to the most elements of the stimulus.

These examples serve to show three points at which different degrees of organization of perceptual units can be recognized. One can select as scoring units the perceptual units involving, first, sub-object description; second, description of a stimulus as an object or "thing"; and third, the description of a stimulus as an object involved in some sort of activity, active or passive. Since the higher levels of organization include or imply the lower levels, quantification consists of a simple summing of the arbitrarily selected perceptual units involved.

Using arbitrary organizational points involving object labeling and the perception of activity, furnishes units for quantifying individual stimulus situations. The more extensive perceptual units involving several sequentially appearing stimulus units can be handled in the same manner, getting a measure of organization for each separate stimulus unit, and then treating the sequence as a whole. The stimulus sequence itself may offer easily definable points at which scoring units can be objectively tacked down. This is true in stimulus sequences in which the separate stimulus units are easily discernable. In such cases a response linking two of the stimulus units together is scored less than a response linking three units together and so on. This follows from our definition of organization in which the more organized or more extensive perceptual units simply contain more stimulus elements.

In respect to this experimental design, the definitions and scoring procedures outlined above, provide us with a fairly objective scoring system. The stimulus cards contain various objects in various states, and each series provides cues for relating the pictures together in a logical way within the series. Thus, within each four-card series there is the possibility of a wide range of organizational scores depending upon the degree to which each picture is organized and the degree to which the sequence is responded to as a single perceptual unit. Specifically, the assignment of the scoring units follows the following schedule:

1. One point is tallied for each instance in the four-card series in which the picture is labeled as an object or "thing"; that is, for perceiving the stimulus as having a specific object content. For the organizational score, only those series and parts of series were utilized in which organization could proceed without intentional disruption of the process through changes in the stimulus cards. Thus, the organization scores were based on all four cards in Series II, V, and VIII, (in which the last card was not changed), and on the first three cards in the other seven series. Thus an individual could optimally accumulate thirty-three points on the basis of object perception alone.

2. One point is tallied for each instance in which the subject responds to the stimulus picture as containing

action, movement, or process. This organizational point revolves around the perception of an event in addition to the objects involved. It may be, in this study's stimulus material, a dog running, one man greeting another, or simply a candle melting. The thirty-three cards scored for organization again allow an optimum 33 points for activity.

3. In the organization of sequences, one point is tallied for each instance in which two cards of the series are linked together by reason of cause and effect, continuation of logical event sequence, or simply the continuation of the objects or activities involved. In defining what constitutes an organized sequence of events, that is, a number of events belonging in one perceptual unit, the most objective criterion was found to be the proposition that a number of sequential stimulus units can be said to comprise a single organized perceptual unit, if the response to these stimulus units labels the object or activity as being the same or a continuation of the same object or event. In the experimental design, this can be determined to a certain extent from the response to each individual picture. However, the most important cues to scoring this sequential organization are found in the responses to the experimenter's question, "What have the three (four) pictures been of?" If the answer gives responses to the cards separately instead of a single answer, no organization is demonstrated. For instance, in

response to the final question, "What have the four pictures been of." on the "Dog" series; a dog, a dog playing, or, a dog walking and digging up a bone and carrying it off, all show a single organized perceptual unit. Dogs, or, dogs in different positions, or, a dog walking, a dog digging, and a dog carrying a bone -- none of these show organization by our definition which requires that the pictures be related by reason of continuation of an object, set of objects, or activity. One point is given when two cards show this organization, another point when three cards are organized into a single perceptual unit, and a third point for four-card organization. A maximum of twenty-three points is possible.

Constancy: The second variable to be measured involves the degree to which the subjects tend to preserve the organized percepts in the face of ambiguous new events. This variable, as with the following three, only involves the seven series in which a changed fourth event is present. Measurement here simply involves the tallying of the number of series in which the individual responds to the ambiguous fourth card as a continuation of the object content and activity posited in his response to the first three. Thus, in this factor and in the following three factors, an individual may pick the category zero to seven times; that is, he may respond with any one of these response categories to each of the seven series.

Reorganization: This variable is quantified simply by tallying the number of times that the individual changes his responses to the first three cards, in terms of object content and activity, after being presented with the ambiguous fourth card.

Isolation: This variable represents the number of times that the response to the ambiguous fourth card is different in object content or activity from the first three, and in which the response to the first three cards is not changed after perceiving the fourth--thus leaving the subject with two separate perceptual units.

Indecision: This variable simply represents the number of times in which the individual is unable to respond with object content of activity to the fourth card, after having produced some degree of organization on the first three.

For an example of a partial protocol and its scoring, see Appendix A and B.

Reliability: An attempt was made to check the realibility of the scoring procedures in order to help evaluate the significance of the results. This was accomplished by having fifteen of the protocols scored by a psychologist unfamiliar with the hypotheses and procedure utilized in this study. On the basis of the scoring description included in the previous paragraphs alone, he scored every third protocol in the normal

group, and these scorings were then compared with the original ones. The correlation, Rho corrected to Pearson r, was .774 for the two sets of organizational scores. The organizational score, it will be remembered, is the sum of the points assigned for object perception, activity, and sequence organization.

The comparison of the two judges' scoring of the four response alternatives, Constancy, Reorganization, Isolation, and Indecision, shows a very close agreement. The judges agreed on 92 out of 105 separate judgments, for an 88% agreement. Table III shows the frequency with which Judge B agreed with Judge A in assigning responses to each category. Also included in the table are the proportions of responses agreed upon in each category. As can be seen, no category fell below a 71.4% agreement.

TABLE III

FREQUENCY AND PROPORTION OF AGREEMENT OF JUDGE B WITH JUDGE A ON FOUR RESPONSE CATEGORIES

	Constancy		Reorganization		Isolation		Indecision	
	Freq.	Prop.	Freq.	Prop.	Freq.	Prop.	Freq.	Prop.
Agreement	37	.841	27	.900	23	.958	5	.714
Disagreement	7		3		1		2	

RESULTS AND DISCUSSION

Limited Perceptual Units

One hypothesis of this study was that the schizophrenic individual tends to react to stimulus situations with limited perceptual units. This factor was measured by the organizational score, which involved the number of stimulus elements that a perceptual unit included.

The scoring of the perceptual units embraced three levels of inclusion of stimulus elements, each of which yielded a maximum of twenty-three or thirty-three points, depending on whether it was scored for three or four cards. The total organizational scores, summing all three levels, yielded scores ranging in the normal group from forty-four to eighty-two points, and in the schizophrenic group, from thirty-seven to seventy-four points. Table IV shows the organizational scores for two, three, and four cards, in the sequences and the total organizational score. As Table IV indicates, the mean of the total organizational scores for the normal group was 65.44, and for the schizophrenic group was 58.56. This 6.88 point difference is significant at below the one per cent level of confidence, thus confirming our hypothesis concerning the relatively limited nature of schizophrenic perceptual units.

At the three levels of organization, the differences in the means varied in significance. At the first level of organization, or Object Content level, the means differed by 1.32 points, giving a t of 2.56. This difference, then, is just short of significance at the one per cent level of confidence, though it can be accepted at below the five per

TABLE IV

DIFFERENCES IN THE ORGANIZATIONAL SCORES OF THE TWO GROUPS

	O_1		O_2		O_3		O_4	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Normal	31.6	1.70	16.30	5.17	17.64	4.52	65.44	7.78
Schizophrenic	30.32	3.18	13.80	5.07	14.34	5.28	58.56	11.03
t	2.56*		2.43*		3.32**		4.99**	

* Significant at .05 level of confidence
** Significant at .01 level of confidence

cent level. Again the difference is in the direction suggested by the hypothesis and indicates that the limited perceptual units become evident even at the lowest level of organization. At the second level, or activity, the difference in means is again significant at the five per cent level of confidence, but just falls short of significance at the one per cent level. The findings continue to suggest that the schizophrenic group

utilizes more limited perceptual units at all levels of extensiveness of stimulus situations. At the third organizational level, or Sequenciality, the normal mean is 17.64 and the schizophrenic mean is 14.34. This difference is significant at below the one per cent level of confidence, and the difference is in the direction predicted by the hypothesis.

Thus, the means of the two groups for the organizational scores all show differences in the expected direction, with thesignificance being acceptable at the five per cent level of confidence for the lower organizational levels, and at the one per cent for the highest level and for the total organizational score.

In order to get additional data concerning the nature of the patients contributing to the difference between the normal and the schizophrenic groups, the schizophrenic group was divided into two sub-groups involving different degrees of chronicity of the disorder. Often in studies of this type the differences that are found are attributable to a small group of severly disorganized patients who contribute practically all of the deviancy. The chronicity of the disorder was measured by the number of months since the onset of the disease process, as defined as the first hospitalization. In the group used in this study, the length of time since the first hospitalization ranged from 165 months to nine months. The median point, or 40.5 months, was taken as

the cut-off score for dividing the group into acute and chronic sub-groups. Table V shows the means and significance of the difference between those means for the two groups in regard to the organizational scores. As can be seen, there was no difference between the two groups.

TABLE V

ORGANIZATIONAL DIFFERENCES BETWEEN SCHIZOPHRENIC SUB-GROUPS

	O_t		O_1		O_2		O_3	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Short Term	57.64	9.94	30.08	3.26	13.96	4.35	13.96	5.24
Long	59.04	11.96	30.48	3.07	14.00	6.03	14.76	5.29
t.	.438		.246		.289		.526	

The highest score for testing the significance of difference between means was .526, far below the necessary requirements for statistical significance at even the five per cent level of confidence. Since the two sub-groups failed to show any difference in performance in regard to organizational scores, the total schizophrenic group was considered to be relatively homogeneous in regard to their organization of perceptual units, and no further attempt was made to analyse the data ccording to schizophrenic sub-groupings.

Rigid Perceptual Units

A second hypothesis of this study concerned itself with the rigidity of the perceptual unit once it was established. The prediction was made that the schizophrenic group would resist the opportunity to alter the elements within a perceptual unit in order to take into account new elements, preferring to isolate the new elements in a separate perceptual unit. As will be remembered, there were four response alternatives available to the perceiver when presented with a new ambiguous stimulus unit in a stimulus sequence. These alternatives were labeled Constancy, Reorganization, Isolation, and Indecision. All four response categories were utilized in the scoring system in order to have an objective scoring for each response. By dealing with all the response alternatives, it was possible to delineate more accurately the response categories dealt with in the hypotheses,and thus make the scoring system more objective. However, only the categories labeled Reorganization and Isolation were of specific concern to this study.

Our hypotheses would predict that there would be significant differences between the normal and the schizophrenic groups in the amount of Reorganization and Isolation in the perceptual units elicited by the picture sequences. As will be remembered, there were seven series of pictures in which reorganization could occur. Thus, each subject could produce up to seven reorganizations.

In Table VI, showing the distribution of the Reorganization scores, the distribution of the total sample (both groups) was divided at the median, forming a High Reorganization and a Low Reorganization group. As Table VI indicates, the median point fell among subjects having a zero Reorganization score (See footnote, Table VI). Thus, those subjects in the Low Reorganization subgroup failed to produce any Reorganizations at all, while those in the High Reorganization subgroup had up to seven Reorganizations. The Schizophrenic and Normal groups were then divided into High and Low Reorganization subgroups on the basis of the median score for the total distribution.

Table VII shows the number of subjects in each of the subgroups. As can be seen, thirty-two normals fell into the High Reorganization category, whereas only eighteen of the schizophrenics fell there. Eighteen of the normals fell into the Low Reorganization category, whereas thirty-two of the schizophrenics fell there. When the null hypothesis was tested for these differences, using the Chi-Square technique, it was found that the hypothesis that no true differences exist can be rejected at the one per cent level of confidence. The differences between the two groups are in the expected direction; that is, the differences reflect the fact that the normal group tends to reorganize perceptual units more often than the schizophrenic group. Thus, these

TABLE VI

THE DISTRIBUTION OF REORGANIZATION SCORES AND THEIR DIVISION INTO HIGH AND LOW REORGANIZATION SUBGROUPS

Score	Total Sample		Normals		Schizophrenics	
	Freq.	Total	Freq.	Total	Freq.	Total
*0.00-0.94	50	50	18	18	32	32
Total Sample Median						
0 .94-0.99	3		1		2	
1	20		12		8	
2	13		8		5	
3	2		0		2	
4	8		7		1	
5	3		3		0	
6	1		1		0	
7	0	50	0	32	0	18
Total		100		50		50

*In dividing the Normal and Schizophrenic groups into High and Low Reorganization subgroups on the basis of the median of the total distribution, it was found that 53% of the total sample attained a zero reorganization score. Thus, to get the exact median point, with 50% of the subjects below and 50% of the subjects above it, it was necessary to consider the score of 0 to be a class of scores ranging from 0.00 to 0.99 (19). Since three more subjects needed to be placed in the upper 50%, the median point had to fall 50/53, or .944, of the way into that class, or at 0.94. The scores for the Normal and Schizophrenic groups were then divided into High and Low Reorganization subgroups at that median point. Again, the zero score was considered to be a class of scores and .94 of them were placed in the Low Reorganization subgroup and .06 of them fell in the High Reorganization subgroup. The groups were divided at the exact median of the total sample so as to provide a precise and logical basis for establishing high and low groups for Chi-Square comparison. However, other dividing points such as between the score of zero and one, also result in significant differences in the expected direction.

findings tend to confirm this studie's hypothesis concerning the rigidity of schizophrenic perception.

TABLE VII

DIFFERENCES BETWEEN THE TWO GROUPS IN THE REORGANIZATION OF PERCEPTUAL UNITS

	High Reorganization	Low Reorganization
Normal	32	18
Schizophrenic	18	32
Chi-Square	*7.84	

Table VIII shows the distribution of Isolation scores. Again the groups were divided into High and Low Isolation subgroups on the basis of the median for the total sample. Table IX shows the differences between the two groups when divided into High and Low Isolation subgroups. Thirty-one of the normals and only nineteen of the schizophrenics fell into the Low Isolation category, whereas thirty-one of the schizophrenics and nineteen of the normals fell into the High Isolation category.

Again, Chi-Square was used to test the significance of the differences. As can be seen, the null hypothesis can be rejected at the two per cent level of confidence. The differences were in the expected direction, with the

TABLE VIII

THE DISTRIBUTION OF ISOLATION SCORES AND THEIR DIVISION INTO HIGH AND LOW ISOLATION SUB GROUPS

Score	Total Sample		Normals		Schizophrenics	
	Freq.	Total	Freq.	Total	Freq.	Total
0	18		12		6	
1	11		7		4	
2	17		10		7	
*3.0 - 3.2	4	50	2	31	2	19
Total Sample Median						
3.2 - 3.9	16		7		9	
4	27		9		18	
5	4		2		2	
6	3		1		2	
7	0	50	0	19	0	31
Total	100		50		50	

*The median score is 3 for the total sample. However, there were 20 subjects attaining that score, with 46% of the subjects falling below the score of 3, and 54% of the subjects scoring 3 and above. Thus, to get the exact median point, with 50% of the subjects below and 50% of the subjects above it, it was necessary to consider the score of 3 to be a class of scores ranging from 3.00 to 3.95. Since four more subjects need to be placed in the lower 50%, the median point must fall 4/20, or .2, of the way into that class, or at 3.20. The scores for the Normal and Schizophrenic groups were then divided into High and Low Isolation subgroups at that median point. Again, since there were several subjects in both groups which attained the score of three, .2 of those tie scores were put in the Low Isolation subgroups, and .8 in the High Isolation subgroups. Thus, the dividing point was maintained at the score of 3.20.

schizophrenic group tending to place more subjects in the High Isolation category, and the normal group tending to place more subjects in the Low Isolation category. Thus, these findings also support the hypothesis that schizophrenic subjects tend to form more rigid and less extensive perceptual units than do normals.

TABLE IX

DIFFERENCES BETWEEN THE TWO GROUPS IN ISOLATION OF PERCEPTUAL UNITS

	High Isolation	Low Isolation
Normal	19	31
Schizophrenic	31	19
Chi-Square	*5.76	

*Significant at the .02 level of confidence.

In all instances where Chi-Square techniques were utilized, the Yates correction for cell frequencies of less than fifty was applied (41).

Discussion

The results of this study give support to the view that schizophrenics tend to limit their perceptual units. By utilizing the basic concepts of stimulus and perceptual

units, and defining the relationship between these stimulus-response units in terms of the number of stimulus elements found in the perceptual unit, this study makes more meaningful and generalizable the thought-perception deviancy found in schizophrenia. This difference in the way schizophrenics organize or respond perceptually to stimulus units of varying degrees of complexity has been reduced to easily handled concepts which can serve to delimit behavior units gathered from a great variety of situations. Moreover, the variable of extensity of the perceptual unit, measured by the number of stimulus elements incorporated in it, forms a continuum applicable to normal as well as abnormal perception. It provides a variable which is easily identified and quantified, and which is applicable to perceptual processes observed in any setting. The concepts such as the abstract-concrete attitudes of Goldstein (18), the "Complexes" of Vigotski (43), or the "Paleologic thinking" of Ariety (1), introduce the inference that these conceptual schemas represent elements of a dichotomy, one element of which represents schizophrenic behavior and the other, normal behavior. This has led to the search for labels and terms which will effectively emphasize the boundry line between schizophrenia and normality, and as a result, has led to a confusing mixture of concepts and conceptual schemas. Goldstein does imply that his variables are actually continnua rather than discrete entitles, since all tasks

require a certain amount of abstract, and a certain amount of concrete behavior (18). However, he also implies that there is a distinction between abstract and concrete behavior, which makes it different from a continuum of, say, abstraction which involves the same process whether it is the simple "abstracting out" of figure ground elements, the more extensive "abstraction" of color or form elements, or an extensive "abstracting out" of color, form, and relationship stimulus elements.

The results of this study suggest that the differences between schizophrenic perceptual behavior and that of normals can be placed on a continuum involving the basic, generally applicable concepts of stimulus and perceptual units.

The findings concerning the rigidity of the schizophrenic perceptual units also suggest that one further aspect of schizophrenic thought can be integrated into a more generally applicable conceptual schema. When a schizophrenic individual is faced with the problem of dealing with an ambiguous stimulus unit which may or may not "belong" to a previously established perceptual unit, the results indicate that he will tend more often than the normal to isolate that unit rather than to reorganize his existing unit so as to make it more meaningful. The assertion has been presented in this study that this phenomenon can best be understood as a further extension of the schizophrenic's attempt to limit the stimulus situation.

By isolating this new perceptual unit, the schizophrenic does not need to respond to all the stimulus elements that would require his attention if he were to logically include that stimulus unit in the existing perceptual unit.

It is a little difficult to understand the lack of difference between the short term and long term subgroups of the schizophrenic sample. One would expect that the long term schizophrenics would show more evidence of perceptual deviation than would the schizophrenics whose disorder had not had so long to progress. A possible explanation for the negative findings lies in the fact that regardless of the wide range in the length of time since onset of the disorder, the schizophrenic group was purposely limited to those individuals presently well oriented and in good contact with reality. It was felt that too many studies owed their "significant" findings to a subgroup of patients so disoriented and disorganized that they would differ from normals on any task that involved some degree of cooperation and attention. Most of the patients used in this sample were from privileged wards, and all were in sufficiently good shape to be able to attend to, and to comprehend the instructions concerning the perceptual task. No patients were used who had so completely "limited their perceptual units" that their irrelevant responses proceeded completely from inner stimulation. A criticism of this part of the study is that the schizophrenic

subgroups were not controlled for age. This defect in the experimental design may also account for the lack of differences between the two schizophrenic groups.

SUMMARY AND CONCLUSIONS

The purpose of this study was to test certain hypotheses concerning schizophrenic cognitive functioning through the use of a new perceptual task. The hypotheses grew out of the assumption that schizophrenia involves a general behavior pattern aimed at reducing the amount of stimulation to which the schizophrenic individual must respond.

A perceptual task was designed comprising ten series of stimulus events. Each series contained four interrelated events. The ten four-card sequences were presented ambiguously by projecting them on a screen out of focus. Seven of the ten series were characterized by a fourth event in the series which was so drawn as to allow either a complete change in the meaning of the sequence, a preservation of the original meaning through the four cards, an isolation of the fourth card from the first three, or an avoidance of any response to the fourth card.

The responses to this task were scored according to the conceptual schema of extensiveness of perceptual units. The extensiveness of a perceptual unit was defined as, and measured by, the number of stimulus elements from the stimulus unit included in the perceptual unit.

On the basis of the assumption concerning the schizophrenic's basic need to limit stimulus situations, the following general hypothesis was formulated: The schizophrenic process involves a relative inability of the individual to organize stimulus values into extensive, flexible perceptual units, or conversely, a tendency of the schizophrenic individual to react to stimuli of various degrees of potential meaning by forming relatively limited, rigid perceptual units.

Two groups of subjects were used -- fifty normals and fifty schizophrenics. The variables of age, education, and intelligence, as measured on the Wechsler Bellevue vocabulary scale, were controlled.

The results that were obtained suggest the following specific conclusions:

1. The perceptual units elicited in schizophrenics by stimulus events of varying degrees of complexity are more limited than those of normals: that is, they include fewer of the potential stimulus elements.
2. The perceptual units of schizophrenics are more rigid than those of normals: that is, they do not tend as often to change their responses in light of changing stimulus events.

In general, this study offers evidence to support the assertion that the cognitive disorder commonly found in

schizophrenia involves a general tendency to restrict or limit the amount of stimulation to which the schizophrenic must respond, and that this is reflected in the limited number of stimulus elements in the schizophrenic perceptual unit, and in the rigidity of that unit.

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APPENDICES

APPENDIX A

Partial Protocol*

A familiarity with the specific nature of the data accumulated in this study and a close look at the exact scoring methods can perhaps best be attained through an examination of the following partial protocol. Table No. IX contains a tally sheet with the appropriate scoring for subject A on the first two picture series.

Subject A:

Series I

Card 1. Just looks like a bunch of lines . . . hard to make out.

Card 2. Oh, I guess it's an ice cream cone. . . it's tipping over.

Card 3. I guess it's still the ice cream cone . . . tipping over farther.

(Ques: What have the three pictures been of?)

They've been of an ice cream cone melting and tipping over.

Card 4. That looks like a man landing with a parachute.

(Ques: What have the four pictures been of?)

The first three were of an ice cream cone tipping over and the last one was a picture of a parachutist landing.

---

*Scoring shown in Appendix B.

Series II

Card 1. Looks like a candle.

Card 2. Still looks like a candle.

Card 3. It's burning down and getting shorter.

(Ques.) They've been of a candle gradually burning down.

Card 4. It's burned way down.

(Ques.) A candle . . . burning down.

APPENDIX B

TABLE X

SCORING DATA SHEET

		Subject A Series											Subject B Series		
		1	2	3	4	5	6	7	8	9	10		1	2	3
Object Content															
	1.	0	1												
	2.	1	1												
	3.	1	1												
	4.		1												
Activity															
	1.	0	0												
	2.	1	0												
	3.	1	1												
	4.		1												
2 Card Organization		1	1												
3 Card Organization		1	1												
4 Card Organization			1												
Organization total per Series		6	9												
Organization total per Subject												56			
Constancy															
Constancy total												3			
Reorganization															
Reorganization total												2			
Isolation		1													
Isolation total												2			
Indecision															
Indecision total												0			

APPENDIX C

TABLE XI

ORGANIZATIONAL SCORES IN THE NORMAL GROUP

Sub.	O_1	O_2	O_3	O_t*	Sub.	O_1	O_2	O_3	O_t
1	33	13	3	49	26	32	20	18	70
2	33	19	19	71	27	33	17	21	71
3	32	24	20	76	28	31	23	16	70
4	29	12	12	53	29	29	16	18	63
5	27	17	18	62	30	32	16	23	71
6	31	15	18	64	31	33	16	15	64
7	32	10	23	65	32	28	12	19	59
8	33	22	22	77	33	33	21	21	75
9	33	5	20	58	34	33	22	20	75
10	32	20	21	73	35	33	24	22	79
11	31	19	19	69	36	29	18	18	65
12	33	17	17	67	37	32	16	17	65
13	32	16	18	66	38	31	20	15	66
14	32	22	4	58	39	30	14	20	64
15	33	27	22	82	40	32	19	19	70
16	33	23	21	77	41	33	23	21	77
17	32	12	14	58	42	27	17	19	63
18	33	17	21	71	43	32	15	13	60
19	33	18	18	69	44	33	16	17	66
20	32	16	20	68	45	33	10	15	58
21	28	10	20	58	46	32	6	7	45
22	29	17	18	64	47	31	17	17	65
23	33	14	17	64	48	33	7	4	44
24	31	13	21	65	49	33	9	19	61
25	33	20	21	74	50	32	3	20	55

* O_1 is first level of organization or Object-Content
O_2 is second level of organization or Activity
O_3 is third level of organization or Sequenciality
O_t is total organizational score

TABLE XII

RESPONSE CATEGORIES IN THE NORMAL GROUP

Sub.	C	R	Is.	In.*	Sub.	C	R	Is.	In.
1	3	0	4	0	26	3	0	3	1
2	4	2	0	1	27	3	4	0	0
3	2	0	5	0	28	1	0	4	2
4	2	0	4	1	29	5	2	0	0
5	1	0	4	2	30	3	0	2	2
6	3	2	2	0	31	3	0	4	0
7	6	0	1	0	32	4	0	3	0
8	3	1	3	0	33	2	2	3	0
9	3	4	0	0	34	2	1	4	0
10	2	2	3	0	35	1	6	0	0
11	2	1	2	2	36	2	4	1	0
12	3	4	0	0	37	2	2	2	1
13	4	0	3	0	38	3	0	3	1
14	1	0	6	0	39	3	0	3	1
15	4	1	2	0	40	3	1	3	0
16	4	1	2	0	41	4	1	2	0
17	2	1	2	2	42	3	1	1	2
18	5	2	0	0	43	1	1	4	1
19	1	5	0	1	44	1	5	1	0
20	1	4	1	1	45	3	2	2	0
21	4	1	1	1	46	1	0	4	2
22	5	0	0	2	47	4	0	2	1
23	2	4	0	1	48	4	1	2	0
24	2	5	0	0	49	2	0	5	0
25	3	0	4	0	50	2	4	0	1

* C = Constancy
R = Reorganization
Is. = Isolation
In. = Indecision

TABLE XIII

ORGANIZATIONAL SCORES IN THE SCHIZOPHRENIC GROUP

Sub.	O_1	O_2	O_3	O_t	Sub.	O_1	O_2	O_3	O_t
1	30	10	7	47	26	33	15	15	63
2	32	12	9	53	27	33	10	19	62
3	33	15	18	66	28	29	7	14	50
4	28	19	16	63	29	33	19	18	70
5	29	20	16	65	30	33	15	19	67
6	30	11	18	59	31	30	17	18	65
7	31	5	8	44	32	31	2	1	34
8	33	22	19	74	33	33	22	19	74
9	33	16	20	69	34	31	14	9	54
10	29	17	18	64	35	33	13	12	58
11	31	8	16	55	36	33	12	18	63
12	30	0	7	37	37	27	16	17	60
13	32	25	21	78	38	26	9	14	49
14	30	16	18	64	39	32	17	17	66
15	30	14	18	62	40	24	12	6	42
16	33	18	13	64	41	28	14	16	58
17	32	15	12	59	42	32	16	20	68
18	27	15	10	52	43	24	13	16	53
19	31	18	16	65	44	27	16	18	61
20	33	19	21	73	45	33	15	18	66
21	22	8	5	35	46	31	15	21	67
22	33	20	20	73	47	32	1	2	35
23	18	6	7	31	48	29	17	5	51
24	33	15	17	65	49	32	8	14	54
25	32	15	8	55	50	33	16	13	62

TABLE XIV

RESPONSE CATEGORIES IN THE SCHIZOPHRENIC GROUP

Sub.	C	R	Is.	In.	Sub.	C	R	Is.	In.
1	3	0	2	2	26	2	1	4	0
2	6	1	0	0	27	1	3	2	1
3	3	0	4	0	28	3	0	3	1
4	4	0	3	0	29	3	0	4	0
5	2	0	3	2	30	3	0	4	0
6	4	0	0	3	31	1	0	4	2
7	4	2	1	0	32	2	0	5	0
8	3	0	4	0	33	1	2	4	0
9	2	3	0	2	34	3	0	4	0
10	2	0	4	1	35	4	0	3	0
11	2	0	5	0	36	3	0	4	0
12	3	0	3	1	37	3	0	2	2
13	3	2	1	1	38	2	0	1	4
14	2	2	3	0	39	1	1	3	2
15	4	0	3	0	40	1	0	4	2
16	3	0	4	0	41	3	0	4	0
17	4	1	2	0	42	2	0	4	1
18	3	0	0	4	43	3	0	0	4
19	2	2	1	2	44	4	0	2	1
20	2	4	0	1	45	3	0	4	0
21	1	0	2	4	46	3	0	3	1
22	3	1	3	0	47	1	0	6	0
23	2	0	2	3	48	1	0	6	0
24	3	1	3	0	49	2	1	4	0
25	3	0	4	0	50	2	1	4	0

TABLE XV

ORGANIZATIONAL SCORES OF SCHIZOPHRENIC SUB-GROUPS

Short Term					Long Term				
Sub.	O_1	O_2	O_3	O_t	Sub.	O_1	O_2	O_3	O_t
2	32	12	9	53	1	30	10	7	47
4	28	19	16	63	3	32	19	18	65
9	33	16	20	69	5	29	20	16	66
10	29	17	18	64	6	30	11	18	59
11	31	8	16	55	7	31	5	8	44
18	27	15	10	52	8	33	22	19	74
21	22	8	9	36	12	30	0	7	37
24	33	15	17	65	13	32	29	21	78
26	33	15	15	63	14	30	16	19	65
28	29	7	14	50	15	30	14	18	62
29	33	19	18	69	16	33	18	13	64
30	33	15	19	67	17	32	15	12	59
33	33	22	19	74	19	31	18	16	65
34	31	14	9	54	20	33	19	21	73
35	33	13	12	57	22	33	20	20	73
36	33	12	18	63	23	18	6	7	31
38	26	9	14	49	25	32	15	8	55
40	24	12	6	43	27	33	10	19	62
41	28	14	16	58	31	30	17	18	65
42	32	16	20	68	32	31	2	1	34
43	24	13	16	54	37	27	16	17	60
46	31	15	21	67	39	32	17	17	66
47	32	1	2	35	44	27	16	18	61
48	29	17	5	51	45	33	15	18	66
50	33	16	13	62	49	32	8	14	94

Series II

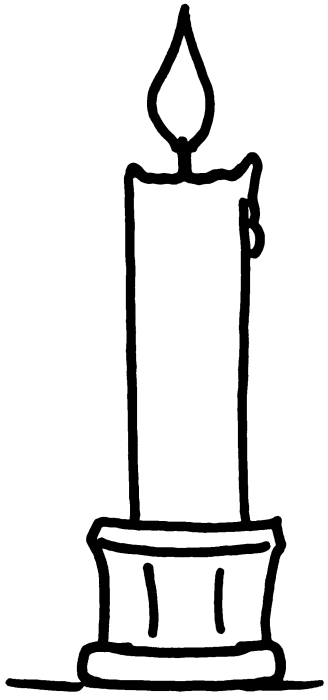

Fig. 1

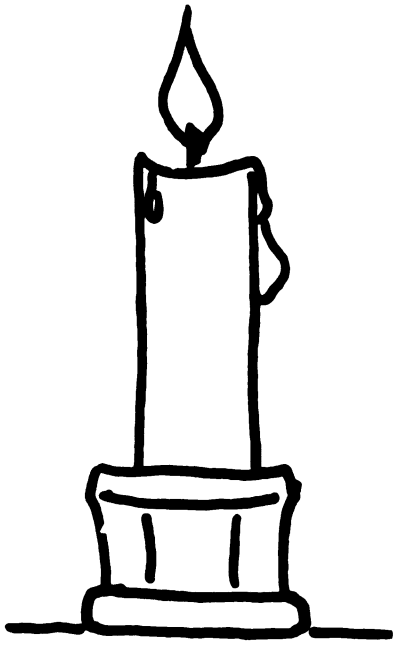

Fig. 2

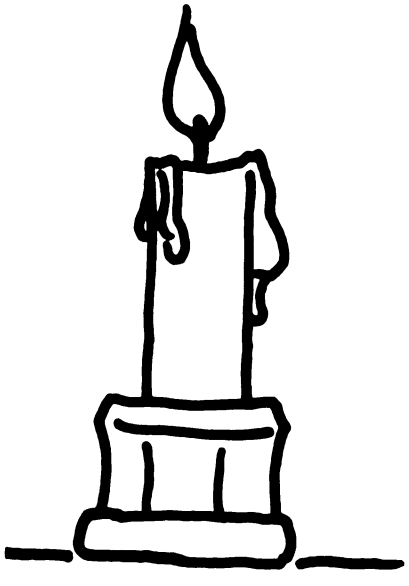

Fig. 3

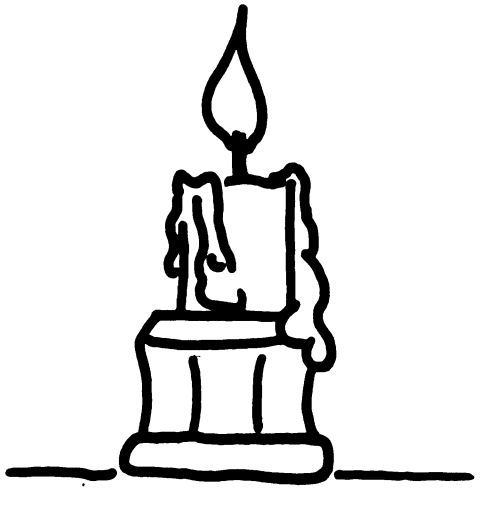

Fig. 4

Series VIII

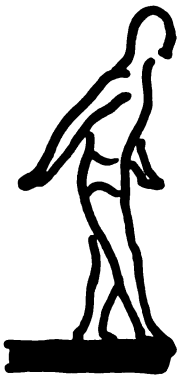

Fig. 1

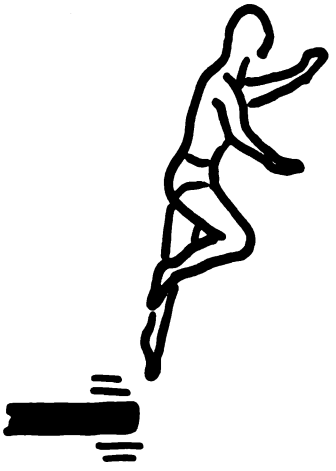

Fig. 2

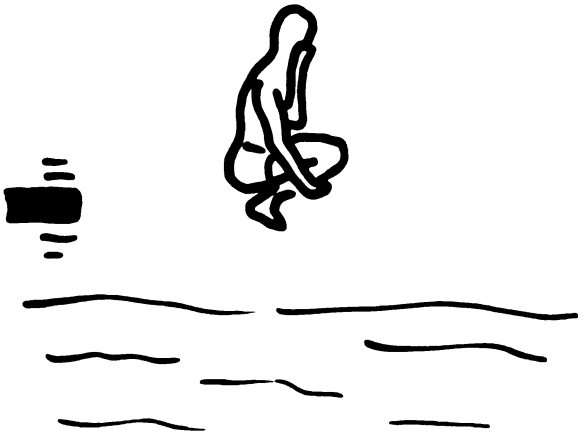

Fig. 3

Fig. 4

Series IX

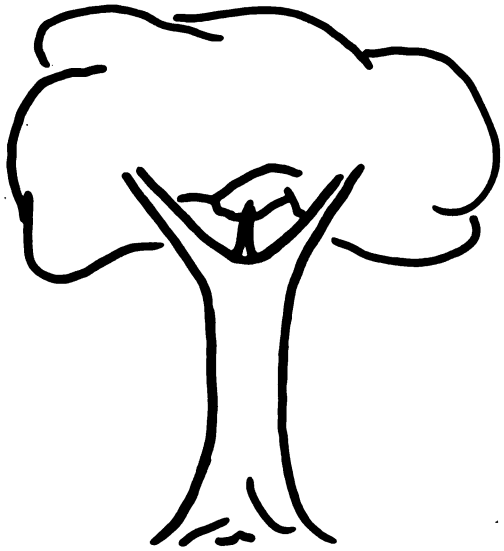

Fig. 1

Fig 2

Fig. 3

Fig. 4

Series IX

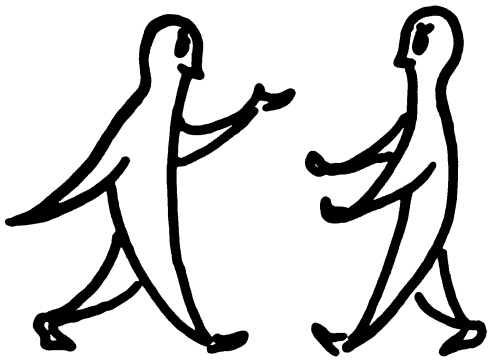

Fig. 1

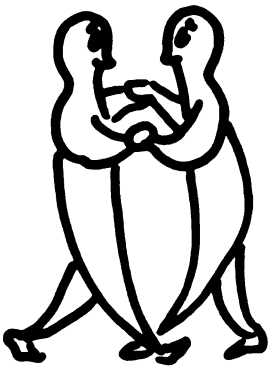

Fig. 2

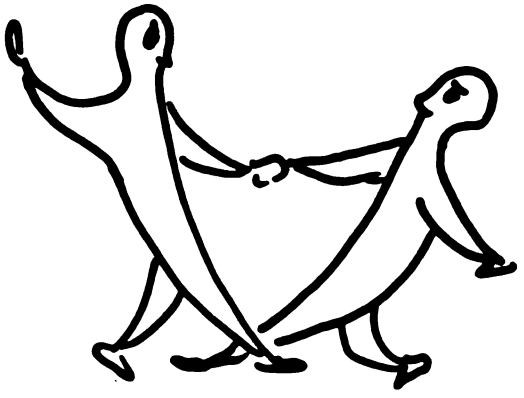

Fig. 3

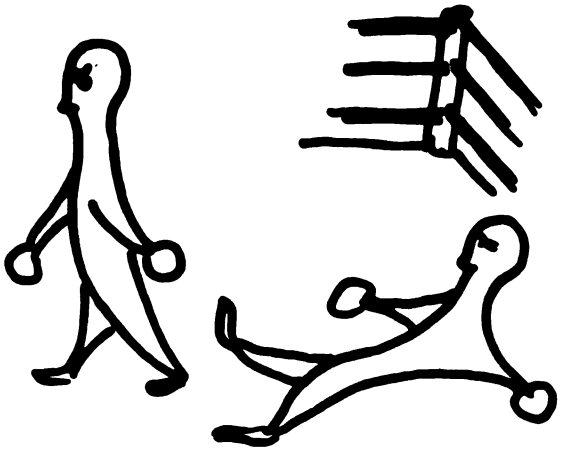

Fig. 4

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