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CONTACT CUE PREFERENCE AS A FUNCTION OF WITHDRAWAL AND REGRESSION IN SCHIZOPHRENIA

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CHAPTER I

INTRODUCTION

There is widespread disagreement and vagueness as to what constitutes schizophrenia. After reviewing the literature concerning this disorder, one may be left with the initial impression that the longer psychologists study schizophrenia the less they know about it.

Earlier writers often seem much more secure in their pronouncements than most of the current authors in this field. One could conclude, with Bellak, that, "It is easier to be categorical about schizophrenics if one does not have too much understanding and knowledge of them" (Bellak, 1958, p. 55). The present lack of assurance and order in this field is, however, hardly due to too much knowledge or understanding. On the contrary, the paucity of validating evidence for competing theories is conducive to much of the continued confusion. Another important source of theoretical disorder is the failure of theorists to communicate

effectively.

Weiner (1958, p. 173) explained that our failure to agree on what we mean by schizophrenia involves not only our knowledge of this disorder but of general psychopathology as well. For instance, many patients now diagnosed as schizophrenics would not be so diagnosed if we could agree upon a restrictive meaning for the label schizophrenia.

Kety, in summarizing the biochemical theories of schizophrenia, concluded, "There is little evidence that all of its forms have a common etiology or pathogenesis. The likelihood that one is dealing with a number of different disorders with a common symptomatology must be recognized and included in one's experimental designs" (Kety, 1959, p. 1528).

Thus, Kety's view is that the class of schizophrenia may be composed of different disorders but with a common symptomatology. Rabin and King, however, deny that there is even a common symptomatology!

> Such a diverse range of symptomatology is subsumed under schizophrenia that the generalizations offered by the results of any single study are likely to be very limited. In studying schizophrenia, two investigators could be concerned with quite different types of behavior although the subjects in both cases would be labeled "schizophrenics." One of the results of this situation seems to be reflected in the frequent negative findings contained in cross-validation studies. Then, too, the data from factor analytic studies provide little evidence for a general schizophrenic factor (Rabin & King, 1958, p. 272).

One can understand better why these difficulties occur when it is realized that schizophrenia is a more or

less arbitrary grouping of persons. Menninger reminded us, "Names do not create illness forms; they only comfort the doctors and impress the relatives" (Menninger, 1958, p. 6).

That there is no genuine dichotomy differentiating schizophrenia from, for example, the manic-depressive psychoses is attested to by the need for the borderline diagnostic category of schizo-affective psychosis (American Psychiatric Association, 1952, p. 27).

Persons who hope to find a definition which embraces all the multiferious features now associated with the label schizophrenia will, thus, have a very long search. With this present state of confusion, one is led to wonder how we came to use the concept of schizophrenia in the first place.

Schizophrenia as Withdrawal and Regression

The differentiation of what was later to be termed schizophrenia from other mental disorders is attributed to Kraepelin. The differentiation was made on the basis of observed cognitive deterioration, which led Kraepelin to call the disorder dementia praecox. Kraepelin viewed this psychopathology as biologically determined and regressive in its nature (McAuley, 1954, p. 18).

Bleuler (1950) contributed the label schizophrenia and described as its outstanding pathological features (a) disorders of association and affect and (b) autism. These two behavioral features are still among the more gen-

erally accepted criteria for schizophrenia (Bellak, 1958, Ch. 4). Even using Bleuler's criteria, however, there is still wide room for disagreement in applying the label to individual patients (Gaw, Reichard, & Tillman, 1953).

According to Freud (1957) and Abraham (1954), both the autism and the disorders of association and affect described by Bleuler result from the withdrawal of libido from external objects and the investing of the libido in the self. Freud explained:

> Already in 1908 K. Abraham expressed the view after a discussion with me that the main characteristic of dementia praecox (reckoned as one of the psychoses) is that in this disease the investments of objects with libido is lacking. (The Psycho-Sexual Difference between Hysteria and Dementia Praecox.) But then the question arose: what happens to the libido of dementia patients when it is diverted from its objects? Abraham did not hesitate to answer that it is turned back upon the ego (Freud, 1957, p. 422).

This investment of libido in the ego instead of in external objects is characteristic, according to psychoanalytic theory, of the infantile state. Freud, therefore, spoke of "the stage of primary narcissism, to which dementia praecox finally returns" (Freud, 1957, p. 428).

Schizophrenia is thus seen, from the psychoanalytic viewpoint, as both a withdrawal and a regression. The withdrawal consists in the shift away from external reality, and the regression consists in a return to an infantile or archaic condition.

Schilder (1939) and Sullivan (1953) have emphasized

the social isolation and withdrawal involved in schizophrenia.

Hanfmann and Kasanin (1937), Kasanin and Hanfmann (1938), and Vigotsky (1934) produced evidence supporting the regressive nature of the schizophrenic reaction. As recent a writer as Arieti based his final definition of schizophrenia upon the process of regression.

> Schizophrenia is a specific reaction to an extreme state of anxiety, originating in childhood, and reactivated later in life by psychological factors. The specific reaction consists of the adoption of archaic mental mechanisms, which belong to lower levels of integration (Arieti, 1955, p. 384).

Similarly, Hoskins (1946) showed that the evolution of man involved ever increasing levels of integration and that the biological implication of schizophrenia is the regressive loss of that integration.

The description of schizophrenia as a regression, however, has been challenged by several authors. Cameron (1938; 1939) and Sechehaye (1956) stipulated that by regression we must not imply that the schizophrenic literally returns to a state characteristic of a healthy infant or of a mature adult primitive. In the case of the child, the organism is in the midst of a growth process; and in the case of the primitive adult, there is good contact with others.

Even Arieti (1955), who viewed schizophrenia essentially as a regression, pointed out reasons why the concept of regression cannot be applied literally to these patients.

Arieti explained that, in the case of life forms more primitive than man, there is a functional equilibrium in which each species senses and reacts to its environment according to its biological endowment. On the other hand, in the schizophrenic, regression may have taken away much of his evolutionary advancement but does not make it possible for the schizophrenic to function literally as an infrahuman organism.

Regression, when applied to the schizophrenic process, is thus evidently an analogy (Lief, 1948, p. 555). We observe the behavior of animals, of children, and of primitive men, and we see in them analogies to the behavior of schizophrenics, and so we call the schizophrenic regressed.

It can be noted that all of the approaches to schizophrenia described thusfar include either or both of two features: withdrawal and regression. Numerous other contributions dealing with various aspects of schizophrenia also either are consistent with or rely upon one or both of these features (Bateson, Jackson, Haley, & Weakland, 1956; Beck, 1938; Beck, 1954; Epstein, 1953; Levy, 1943; Meadow, 1953; Mednick, 1958; Rapaport, 1951; Rashkis, 1947; von Domarus, 1944).

Although withdrawal and regression are basic to current theories of schizophrenia, these concepts are nonetheless quite vague. How can we specify what is involved

in regression and withdrawal so as to provide observable and preferably measurable consequences of these somewhat nebulous concepts? Let us pursue the ideas of regression and withdrawal in an attempt to arrive at behavioral implications which are experimentally verifiable. It will be shown below that both withdrawal and regression raise the possibility of a shift towards greater contact cue responsiveness as opposed to distance cue responsiveness.

Regression, for example, can be considered as (a) a reversal of the development of the species (phyletic regression) and as (b) a reversal of the development of the individual (ontogenetic regression). If it can be demonstrated, then, that early stages of either or both phyletic or ontogenetic development are characterized by relatively high degrees of dependence on contact cues, then we could expect regression to be accompanied by a shift from distance cue responsiveness to contact cue responsiveness.

Contact Cue Responsiveness in Phyletic Regression

Phyletic regression implies a reversal of phyletic evolution. It is to be expected then that an evaluation of the analogy of regression in the phyletic sense would lead us to consider the infrahuman species, since among their characteristics are the features to which we refer when we call a schizophrenic phyletically regressed.

Not only are the perceptual worlds of the various

species different from that of man (Burton, 1953; Fox, 1952; Tinbergen, 1953; von Uexküll, 1926; von Uexküll, 1957), the increasingly primitive life forms function within a correspondingly primitive field of awareness. For example, the sensitivity of the most primitive creatures is restricted to what touches the organism (Hegner, 1947, p. 50).

Although sensitivity to light occurs early in the evolutionary scale, vision is not highly elaborated until we reach the vertebrates, specifically birds and man. Montagu spoke of

> what probably constitutes the most important single factor in the evolution of the primates, namely, the increasing importance and dominance of the sense of vision and the correlated changes associated with it. This vastly increased what has been called "the space of recognition" (Montagu, 1957, p. 39).

The steps of biological phyletic evolution are retraced, by analogy in psychological phyletic regression. One can say of the phyletic evolution of man that the advancement of primitive levels to the more advanced levels is characterized by a shift from responsiveness to contact cues to responsiveness to distance cues. Snygg went so far as to draw this conclusion:

> From what we know of comparative psychology, it seems . . . reasonable to put the threshold of consciousness, free-will, and our insatiable need for self-enhancement, self-actualization, self-worth, creativity, or what you will at that point in evolution where an animal develops distance receptors and with them the need to deal with objects at a distance (and consequently in the future) and a need to select the parts of its environment to which it will respond (Snygg, 1959, p. 12).

Contact Cue Responsiveness in Ontogenetic Regression

Ontogenetic regression, no less than phyletic regression, might be accompanied by increased contact cue responsiveness. As a human being matures, he becomes increasingly aware of a world outside his own skin. He becomes responsive to the sounds and sights of the physical world which surrounds him, and largely through audition and vision he enters the social world of other human beings.

In describing the early development of the infant, Gesell and Ilg (1949) explained that three stages must be achieved for the individual to become fully matured. First, the level of vegetative functions, then the world of things, and finally the world of persons are reached as the infant progresses through what Gesell and Ilg called the three levels of reality. In beginning the process of awareness of the world of things, the authors explained, the infant is moving from a world restricted to his own body to the world at a distance. "He is unaware of distance and depth. For him the visible world is a flat screen or a kaleidoscopic succession of flat screens. Not until he is about nine months old does he begin to probe into the beyond and the beneath" (Gesell & Ilg, 1949, pp. 22-23).

Even at a much later age, seven, when the child passes through a withdrawn and retreating stage, there is a renewal of the importance of perceiving the world through

the tactual mode, a feature of a much earlier age (Ilg & Ames, 1955, pp. 27 & 47).

The observations of Scott (1958) are particularly suggestive on this point. He delineated certain critical stages in the socialization of puppies. He correlated the first stage of this process with the opening of the ears of the puppy, thus making the pup responsive to distance cues. The eyes do not appear to assume functional significance until later. Here we have an instance in which the field of social responsiveness in the pup is presented, by Scott, as a direct function of the ontogenetic development of distance cue sensitivity. Here, as in the human, ontogenetic development involves a shift towards social responsiveness, implemented by increased responsiveness to distance cues.

Contact Cue Responsiveness in Withdrawal

Phyletic and ontogenetic development involve increased distance cue responsiveness. Regression, as a reversal of phyletic or ontogenetic development, might thus involve a shift "backwards" from distance to contact cue responsiveness. Now the question is whether the concept of withdrawal might suggest the same possibility.

One can note at least two ways in which withdrawal is used in psychological literature: (a) as a hypothetical construct or intervening variable and (b) as a descriptive term referring to specific kinds of behavior.

An example of withdrawal as a hypothetical construct

or intervening variable is the psychoanalytic conception of withdrawal as the transfer of libido away from objects and onto the ego (Freud, 1957, p. 422). Within this theoretical framework, objects compose the world apart from the individual himself. If one cathects objects less and himself more, then the possibility is raised that he might become more responsive to kinesthetic and tactual stimuli at the expense of distance stimuli.

Withdrawal is also used to describe specific behaviors. One is said to be withdrawn when his behavior is seclusive, reticent, displaying a lack of interest in the world, appearing distant (Weiner, 1958, pp. 112-113), indifferent and isolated (Hanfmann, 1955, p. 664). One of the most frequent behavioral observations is the apparent loss of social communication and interpersonal activity (Rabin & King, 1958, p. 239; Kelly, 1955, p. 856). Interpersonal communication is largely a matter of visual and auditory stimuli. One's isolation from this external world would remove one from a world largely construed through the distance receptors.

The concept of withdrawal thus appears to be highly suggestive of a decrease in responsiveness to distance cues and possibly a correspondingly greater degree of responsiveness to contact cues.

Regression and withdrawal are by no means mutually exclusive ideas. Both regression and withdrawal suggest

greater responsiveness to contact as opposed to distance cues.

Shift in Cue Responsiveness as Gradual Change in Cue Preference

To say that there has been a shift from distance to contact cue responsiveness does not necessitate an impairment of the sensory mechanisms of vision and audition. Such an impairment has not been demonstrated among schizophrenics (Freeman, 1958), and if such an impairment is present in any given case it would be considered incidental. Hence, a shift towards contact cue responsiveness in schizophrenia would constitute a behavioral preference for contact cues. Cue preference here simply means that when provided an equal opportunity to respond to either contact or distance cues (a free-choice situation) the individual tends to respond to one kind of cue more often than to another. Cue responsiveness and cue preference in this context have equivalent meanings, pointing up the fact that no physiological impairment or facilitation is implied.

One might argue that for a shift towards contact cues to take place at all demands so extensive and so marked a regression or withdrawal that only in the extremely deteriorated cases could we expect to observe this accentuated contact cue preference. Cue preference, however, is not to be conceived in an all or none fashion. The developmental sequence, for example, either ontogenetic

or phyletic, does not involve an abrupt and total transition from one kind of cue preference to another. This process, like most developmental sequences, is gradual and makes its initial appearance in a modest fashion. Even then, there is no complete abandonment of either contact or distance cues.

There are, for example, situations in which tactual qualities are conventionally considered paramount, even among the healthiest and most mature. An instance of this is the distinctive texture of velvet. Conversely, we can hardly expect even a remarkably regressed person to ignore totally all of his visual or auditory cues or invariably to respond only to tactual cues. Accordingly, in positing a shift backwards from distance to contact cue preference, we are expecting a gradual transition, not a total and abrupt shift.

Cue Preference and Criterial Attributes

James (1950) pointed out that it is primarily the characteristic of the person and not the characteristic of the real object that determines which attributes of the object are considered essential and which accidental. Piaget (1954) has experimentally shown that it is part of the process of maturing to learn which attributes to attend to and which to ignore.

Bruner, Goodnow, and Austin (1957) used the term "criterial attribute" to refer to a quality of an object

which, when changed, alters the probability of the object's being recognized as what it is instead of something different. This is a particularly important conception since it offers the basis for the observable operation of cue preference. If one tends to prefer a given kind of cue, e. g., tactual, then the chances are increased that he will consider this kind of cue as criterial when presented a free-choice situation. Hence, the behavioral implication of contact cue preference is that the attributes which are considered criterial in free-choice situations tend to be contact attributes.

Present Evidence for Contact Cue Preference

Although a shift towards contact cue preference among schizophrenics has not been demonstrated experimentally, there is some evidence which is highly suggestive of this phenomenon.

It has been shown (Renshaw, 1930) that children make more use of tactual imagery than do adults. Children and adults were stimulated tactually and asked, under two conditions, to locate the spot stimulated. In one condition, the subjects touched the spot without looking. In the other condition, the subjects looked at the spot. It was found that the children performed better using the kinesthetic-tactual method and that adults performed better using the visual method.

If schizophrenics are considered ontogenetically

regressed, one might expect their behavior to resemble the children's rather than the adults' in Renshaw's study.

In studying the relationship between hallucination and imagery, Cohen (1938) produced evidence that imagery among schizophrenics does differ from the normal in that it is seldom visual or auditory and is usually kinesthetic-thermotactual.

Cohen read aloud a series of brief phrases to 19 normals and 19 schizophrenics and asked them to describe what the phrase brought to mind. He then classified the responses according to the sensory modalities which seemed to dominate the mental image. From his findings, Cohen concluded that there occurs "under schizophrenic conditions a change of imagery which involves exclusion of the external world and exaggeration of the somatic world" (Cohen, 1938, p. 340).

Following Cohen's example, Seitz and Molholm (1947) applied the same technique and produced corroborative evidence for a lowered distance cue imagery in schizophrenia. Their study, like Cohen's, did not involve the immediate behavior of the subjects to cues of the different modalities but was restricted to the experimenter's estimate of the modalities called on in the subjects' mental images when they were read aloud certain phrases.

Some informal evidence of preference for contact cues among schizophrenics was reported by Arieti (1955).

Extremely deteriorated, hospitalized patients were observed to explore their world primarily by touching, particularly by placing objects to the mouth. These are extreme manifestations of contact cue preference, and we might expect less obvious indications of a shift in this direction long before patients reach what Arieti called the last stages. Presumably the shift towards contact cues may progress in deteriorated cases to such extreme lengths that even casual observation of ward behavior reveals this modality preference, which, according to the present contention, may have operated throughout the schizophrenic reaction.

Goldfarb (1956) noticed that schizophrenic children seem to prefer contact cues to distance cues to a dramatic degree. He cited numerous instances in which these children did not communicate or respond upon visual or auditory stimulation. Instead, they were predisposed to pay attention to what they could feel with their hands, face, or mouth.

After long years of examining patients with the Rorschach technique, it is still considered evidence of marked regression for a patient to produce numerous responses which are determined by the apparent texture of the ink blot (Klopfer, 1954, p. 271). The qualities which determine a given response are considered by the subject important or criterial attributes, so that the interpretation of texture determinants as indicative of re-

gression is quite consistent with the possibility of a shift towards contact cue preference among schizophrenics.

What is lacking in the evidence at this point is an experiment in which schizophrenic subjects and controls are actually exposed to contact cues and to distance cues simultaneously and are permitted to respond preferentially to one kind of cue or the other.

CHAPTER II

PROBLEM

It has been shown that regression and withdrawal are concepts commonly used to explain or to describe the schizophrenic reaction. Theoretical grounds were offered for deducing from these concepts a shift in cue preference from distance to contact cues in free-choice situations. In addition, indirect evidence of an empirical nature was offered for such a shift.

Schizophrenia is characteristically a progressive disorder, and hence in the earlier stages of this process there would be less marked regression and withdrawal than after the process has gone on for a period of years (Weiner, 1958, p. 112). Since the increased preference for contact cues is seen as a function of regression and withdrawal, the more extreme the regression and withdrawal, the more marked would be the anticipated shift toward contact cue preference. Consequently, longer-term schizophrenics would show a greater relative preference for contact cues than would shorter-term schizophrenics, who would in turn show a greater relative preference for contact cues than would

nonpsychotics.

The problem is to provide evidence for whether or not these relationships are valid. For this purpose, the following hypotheses are derived:

1. Long-term schizophrenics more frequently than short-term schizophrenics select tactual cues rather than visual cues as criterial attributes in free-choice situations.

2. Short-term schizophrenics more frequently than nonpsychotic controls select tactual cues rather than visual cues as criterial attributes in free-choice situations.

CHAPTER III

METHOD

Selection of Subjects

It has already been pointed out that a clear and precise distinction between schizophrenics and nonschizophrenics is often impossible to make (Bellak, 1958, p. 52). This raises the question of what criterion to use for selecting schizophrenic subjects for this experiment. It seems wise to use the criterion of clinical diagnosis in this research since the results are to be generalized to schizophrenics as they are clinically diagnosed, as opposed to diagnosis by a special experimental criterion, and because the present hypotheses were developed in the context of instances in which the clinical diagnosis was applied. All of the schizophrenics in this study, therefore, were hospitalized. For purposes of the reliability of the diagnosis, two independent observers, either a psychologist at the Ph. D. level or a psychiatrist with an M. D., who were professionally acquainted with the patient in question were asked how they would diagnose the subject. Only in cases in which both observers thoroughly agreed with a diagnosis

of schizophrenic reaction (American Psychiatric Association, 1952) were these patients accepted as subjects.

The group of shorter-term schizophrenics was composed of 30 male subjects. Sixteen of them were selected from the neuropsychiatric wards of the Veterans Administration Hospital, Oklahoma City. This is an acute and intensive treatment center where patients are usually hospitalized no longer than three months. An additional 14 male schizophrenics were selected from open wards of the veterans section of Griffin Memorial Central State Hospital, Norman, Oklahoma. All of these shorter-term schizophrenics had been consecutively hospitalized for less than three years.

The group of longer-term schizophrenics was composed of 30 male subjects, each of whom had been hospitalized with a diagnosis of schizophrenia for more than three years. These patients were all hospitalized in chronic wards of the veterans section of Griffin Memorial Central State Hospital, Norman, Oklahoma.

In addition, 30 male subjects used as controls were selected from the general medical wards of the Veterans Administration Hospital, Oklahoma City. None of these patients were neurological cases nor had a known history of psychosis. All of these control subjects had been hospitalized for at least two weeks prior to their participation in the experiment.

Each of the subjects in the three groups was matched so as to be within approximately five years of the age of a corresponding subject in each of the other two groups (Table 6).

Inasmuch as schizophrenia involves a "thinking disorder" (Weiner, 1958, p. 110), it would not be entirely reasonable to control measured intelligence as a variable, since we could expect the fact of one's membership in either of the two schizophrenic groups to affect measured intelligence in some way. Such an effect might be an inherent part of the schizophrenic process itself. On the other hand, persons who score higher on an intelligence scale might ipso facto prefer distance to contact cues or vice versa. Consequently, an analysis of covariance was applied in the attempt to establish what the differences between these three groups would be if they were made equivalent as to measured intelligence, without at the same time eliminating schizophrenic subjects because they were not equivalent to nonpsychotics as to intelligence scale scores.

Construction of the Materials

The present investigation of contact as opposed to distance cue preference requires the use of stimulus objects with varying tactual and visual attributes. There was a total of 60 such objects, grouped into 20 sets, each set containing three objects. Each set included one standard

object, one object differing from the standard only in terms of the visual attribute, and one object differing from the standard only in terms of the tactual attribute.

Accordingly, the objects were constructed so as to provide marked differences in surface texture while visual characteristics were held constant, and vice versa. In 20 cases, the objects were constructed from two sheets of medium grain sandpaper cemented back to back. To provide a different texture, 20 were cut from smooth cardboard. A third markedly different tactual quality was provided by cementing a thin layer of absorbent cotton on the surface of the standard index cards from which the 20 objects of this sort were constructed.

The visual attributes varied included the color of the object and the presence or absence of a surface marking. The color of any one object was either yellow or blue, and if a surface marking was present, the marking was orange in color and either diamond or circular in shape. The size of the surface markings, regardless of shape, was a quarter inch in diameter. The colors were produced by using yellow, blue, and orange tempera.

These objects were of two shapes: two inch squares and two inch equilateral triangles. All three of the objects in any one set were of the same shape.

Table 1 provides a description of the three objects in each set.

Table 1

The Visual and Tactual Attributes of the Experimental Objects

Set no.	Mode	Standard object	Object A	Object B
1	vis.	circle on yel.	dia. on yel.	circle on yel.
	tact.	cotton	cotton	sandpaper
2	vis.	solid yel.	solid blue	solid yel.
	tact.	cotton	cotton	cardboard
3	vis.	circle on yel.	solid yel.	circle on yel.
	tact.	cotton	cotton	sandpaper
4	vis.	dia. on yel.	circle on yel.	dia. on yel.
	tact.	cardboard	cardboard	cotton
5	vis.	solid yel.	solid blue	solid yel.
	tact.	cardboard	cardboard	cotton
6	vis.	dia. on yel.	solid yel.	dia. on yel.
	tact.	cardboard	cardboard	sandpaper
7	vis.	circle on yel.	dia. on yel.	circle on yel.
	tact.	sandpaper	sandpaper	cardboard
8	vis.	dia. on yel.	circle on yel.	dia. on yel.
	tact.	sandpaper	sandpaper	cardboard
9	vis.	circle on yel.	solid yel.	circle on yel.
	tact.	sandpaper	sandpaper	cotton
10	vis.	circle on yel.	dia. on yel.	circle on yel.
	tact.	cardboard	cardboard	cotton
11	vis.	circle on blue	dia. on blue	circle on blue
	tact.	cotton	cotton	sandpaper
12	vis.	solid blue	solid yel.	solid blue
	tact.	cotton	cotton	cardboard
13	vis.	dia. on blue	circle on blue	dia. on blue
	tact.	cotton	cotton	sandpaper

(Table 1 continued on next page)

Table 1--Continued

Set no.	Mode	Standard object	Object A	Object B
14	vis. tact.	dia. on blue cardboard	circle on blue cardboard	dia. on blue sandpaper
15	vis. tact.	solid blue cardboard	solid yel. cardboard	solid blue cotton
16	vis. tact.	dia. on blue cardboard	solid blue cardboard	dia. on blue cotton
17	vis. tact.	circle on blue sandpaper	dia. on blue sandpaper	circle on blue cardboard
18	vis. tact.	solid blue sandpaper	solid yel. sandpaper	solid blue cardboard
19	vis. tact.	dia. on blue sandpaper	solid blue sandpaper	dia. on blue cotton
20	vis. tact.	dia. on blue sandpaper	circle on blue sandpaper	dia. on blue cotton

Note.-All objects in odd-numbered sets are square, and all objects in even-numbered sets are triangular.

Notice in Table 1 that, in each set, object A was derived by altering only the visual attribute of the standard object, and object B was derived by altering only the tactual attribute of the standard object. For example, set number one contained a standard object of a square shape, with an orange circle on a yellow field and a cotton surface. Object A in this set was identical to the standard object except that the surface marking was diamond in shape. Object B was identical to the standard object in

set number one except that the surface was sandpaper instead of cotton.

Experimental Procedure

The subjects were administered the experimental task individually. The order of presentation of the sets was determined by using tables of random numbers (Diamond, 1959, pp. 286-289; Hill, 1955, pp. 291-306; Snedecor, 1956, pp. 10-13). In order further to minimize uncontrolled serial effects, a given set appeared in the initial serial position at least once but no more than twice for each of the three groups of subjects (Table 7). The subject, after being seated before a table, was handed a standard object. After 10 seconds, he was handed the two additional objects in that set. He was then asked to select from the two additional objects the one which seemed more like the object originally handed to him.

If the subject selected the additional object which was visually identical but tactually different from the standard object, then the visual attribute was criterial, unless the subject was responding on some extraneous basis. If he selected the additional object which was tactually identical but visually different from the standard object, then the tactual attribute was criterial.

The procedure was repeated until all 20 sets were completed. The subject's preference for contact cues was measured by the total number of times out of the 20 sets

he had chosen the tactual attribute as criterial.

Immediately after each subject had completed the 20 sets, he was administered the vocabulary subtest of the Wechsler Adult Intelligence Scale (Wechsler, 1955). This subtest is reported to have a higher correlation with full scale intelligence (about .83) than any of the other subtests (Wechsler, 1955, pp. 15-17) and is, therefore, a good single score from which to estimate intelligence.

CHAPTER IV

RESULTS

The raw score for each subject is the number of times he chose the tactual attribute as criterial. These raw scores were then expressed as percentages of the total 20 responses, and the percentage scores were then submitted to inverse sine transformation (Diamond, 1959, p. 237) (Table 8) to help normalize the distribution of scores and hold variance constant across the range of score values.

Table 2 presents the mean and S. E. of the mean for the tactual scores for each of the groups, expressed in percentages and inverse sine transformation values.

Table 2

Mean Tactual Cue Preference Scores for Short-term and Long-term Schizophrenics and Controls

	Percentage		Transformed	
Group	Mean	S. E.	Mean	S. E.
Controls	37.67	4.39	35.59	3.51
Short-term schiz.	67.00	5.11	57.38	4.18
Long-term schiz.	57.00	5.54	49.55	4.41

Inasmuch as the use of analysis of covariance assumes linearity of regression, the F test for curvilinearity (Diamond, 1959, p. 187) was employed. The results of this test are presented in Table 3. As can be seen from the table, the deviation from linearity is nonsignificant, and the assumption of linearity, therefore, is tenable.

Table 3

Analysis of Linearity of Regression between Tactual Cue Preference and Vocabulary Scaled Scores

Item	Value
r^2	.0025
η^2	.0273
F	1.09[a]

[a] F at p=.05 is 3.11.

Table 4 presents the results of a one-way analysis of variance for the three groups of subjects and an analysis of covariance using the vocabulary scaled scores (Table 9) as covariate (McNemar, 1949, pp. 318 ff.).

The correlations between the vocabulary and the tactual cue preference scores are insignificant as found by t test (McNemar, 1949, p. 226). There may be, of course, some degree of relationship between any two variables, even though the correlation coefficient between them does not differ significantly from zero. To assess the influence of

the degree of relationship, the F for tactual scores was adjusted, yielding an increase from 5.81 to 6.25. The F in both cases is significant at $p<.01$.

Table 4

Analysis of Variance Table for Transformed Tactual Cue Preference Scores with Covariance Adjustments for Vocabulary Scaled Scores

Item	Source: Between groups	Within groups	Total
Mean square	3287.70	566.14	
df	2	87	89
F	5.81*		
r	+.32	-.11	-.05
df for r	1	86	87
t	.34	1.00	.45
Adjusted mean square	3533.18	565.32	
df	2	86	88
Adjusted F	6.25*		

*Significant at $p=.01$.

In determining which specific differences between groups were significant, the Newman-Keuls sequential range test (Duncan, 1955, p. 26; Keuls, 1952; Newman, 1939) was employed. The results of this test are presented in Table 5.

As can be seen from Table 5, the schizophrenic groups differed significantly from the controls. These

differences are in the predicted direction, as shown in Table 2. However, the difference (which was not in the predicted direction) between the two schizophrenic groups was not significant.

Table 5

Comparisons of Tactual Cue Preference Means between Short-term and Long-term Schizophrenics and Controls

Groups	Difference between means	R[a] (p=.05)	R[a] (p=.01)
Short-term - controls	21.79	14.37	17.88
Short-term - long-term	7.83	12.02	15.80
Long-term - controls	13.96	12.02	15.80

[a]Refers to minimum difference between means required to reach significance at p=.05 and p=.01, respectively.

CHAPTER V

DISCUSSION

Both the long-term and the short-term schizophrenics were found to select tactual cues rather than visual cues as criterial attributes more frequently than did the control subjects. In addition to exemplifying the heuristic value of the concepts of withdrawal and regression, as employed here, these findings offer ways for the possible explanation of various aspects of schizophrenic functioning.

Studies of concept formation in schizophrenia by Vigotsky (1934) and Kasanin and Hanfmann (1938) are closely related to the technique applied in this study. The present task of selecting one of two additional objects as more like the first is a special instance of the concept-formation technique used by these writers. In the present study, however, responses were purposely restricted to the variable of tactual as opposed to visual attributes rather than encouraging the subject to form categories and concepts as he will. This restriction may indeed throw some light on an important process operating in the formation of the concept. If the schizophrenic is not only forming strange concepts but is differentially responding to

different kinds of cues, then indeed his concepts would be directly affected, and this process may account for a great deal of the nature of schizophrenic cognition, as described below.

The determination of identities by the simple sharing of a predicate, in schizophrenic cognition, was emphasized by von Domarus (1944). The schizophrenic named Newton may conclude that he is Napoleon, since the two share in common the predicate of being spelled with an initial N. What seems to be operating here is some pathological system by which the schizophrenic determines which attributes he will consider criterial. If the determination of criteriality of attributes is altered by a differential cue responsiveness, widespread effects could be expected on the level of cognition. The shift towards contact cue preference may thus provide an important link in the chain of events behind von Domarus' principle.

Bateson et al. (1956) interpret the basis of the schizophrenic reaction to be the double-bind situation. By this is meant a situation in which the person is confused by contradictory communications, such as the mother's verbal assurances of her love in the face of her contemptuous behavior. An accumulation of these situations in childhood then leads to the schizophrenic's failure to use metacommunication cues properly. For example, when the nurse greets the patient with, "How are you this morning?" he may

fail to recognize the metacommunication cues such as facial expression and tone of voice which place this statement in the category of friendly greeting. Instead, he may supply another meaning to the statement, interpreting it to mean, "Has the poison started working yet?" Hence, his response is bizarre and inappropriate to the situation.

A shift in cue preference towards the proportionately greater use of contact cues could help explain how the failure at the level of metacommunication takes place. Metacommunication cues are, as a rule, subtle cues supplied through the distance modalities and must be attended to at the expense of numerous other simultaneous cues.

Although both schizophrenic groups in this study differed significantly from the control group in contact cue preference scores, the long-term schizophrenics were not significantly different from the short-term schizophrenics in this respect, contrary to expectation. In addition, the short-term schizophrenics made higher tactual scores than did the long-term schizophrenics, a finding in the opposite direction from that expected, although this difference between schizophrenics was not significant.

The failure to demonstrate the expected difference between the two schizophrenic groups calls for some explanation. It seems possible that the lack of a significant difference between these two groups may reflect the arbitrary nature of criteria used for classifying

these patients into long-term and short-term categories. For example, if one used the criterion of no longer than six months continuous hospitalization for the short-term cases, then the predicted differences between long-term and short-term groups might be discernible.

One must ask, nonetheless, what conditions might have led to these results, taking the findings at face value. One might conclude that the shift towards contact cues in free-choice situations takes place relatively early in the schizophrenic reaction and does not appreciably change as the disorder progresses.

Support for this possibility awaits further experimentation, including replications of the present study with variations in criteria for classifying patients into the two schizophrenic groups.

Studies are needed specifically to explore the relationship between cue preference in free-choice situations and behavioral observations of contact cue preference in the patient's daily life. This need is especially pressing since grossly observable contact cue preference in ward behavior is usually associated with the terminal stages, and the longer-term patients in this study failed to show evidence of an increment in contact cue preference over that of the shorter-term patient.

Selecting a tactual cue as criterial in this experimental task appears to be considerably more subtle

a phenomenon than the instances of grasping objects to the mouth and the rubbing and fingering observed in schizophrenics by Goldfarb (1956). It would be worthwhile to discover whether, even though contact cue preference in free-choice situations may not itself be progressive in schizophrenia, the effects of this phenomenon may progressively proliferate into the patient's total way of functioning so as to yield increasingly marked tactual preference in ward behavior. This possibility might explain why a significant difference was not found between the two schizophrenic groups although behavioral reports of tactual cue preference involve primarily long-term cases.

The present research may provide useful applications specifically for the two primary areas of clinical work with schizophrenics: diagnosis and psychotherapy.

Further refinement of the present experimental task may provide a relatively simple and nonthreatening device for the clinical study of patients usually diagnosed schizophrenic. Whether or not this objective can be achieved depends in part on what proves to be the typical performance on this task by other clinical groups, such as neurotics and the brain-injured.

The psychotherapeutic implication of these findings is closely related to the experimental studies of Harlow (1958) and the theoretical observations of psychotherapists

such as Greenacre (1954). Both of these writers point to the importance of warm close contact with others, notably the mother, in the process of development. Harlow demonstrated with monkeys the importance of the need for such contact as distinct from the need for nourishment. Greenacre discussed the genesis and treatment of schizophrenia in these terms:

> Human beings do not thrive well in isolation, being sustained then mostly by memories and hopes, even to the point of hallucination or by reaching out to nonhuman living things (like Mendel and the beans). This need for sensory contact, basically the contact of warm touch of another body but secondarily experienced in the other senses as well (even the word "contact" is significant), probably comes from the long period of care which the human infant must have before he is able to sustain himself (Greenacre, 1954, pp. 671-672).

It is the satisfaction of such needs for concrete, physical contact with another person that may constitute the efficacy in Sechehaye's (1956) successful treatment of schizophrenia. Indeed, if the early and continued deprivation of satisfying physical contact be a precursor of the schizophrenic reaction and if, as these findings suggest, the schizophrenic shows an increased preference for contact cues, then might not the therapeutic task in many cases involve the use of contact cues for effective communication and treatment?

The developmental aspect of cue preference is another important area for further research within the present framework. Essentially the same kind of measuring technique

as reported here could be applied to a developmental study of children, providing needed evidence for the ontogenesis of the cue preferences observed in adults.

CHAPTER VI

SUMMARY

There is a considerable amount of agreement that persons considered schizophrenic behave in ways that prompt observers to call them regressed or withdrawn.

It has been shown that either of these descriptions is consistent with the possibility of a shift, in this disorder, towards greater contact (as opposed to distance) cue preference.

The following hypotheses were tested:

1. Long-term schizophrenics more frequently than short-term schizophrenics select tactual cues rather than visual cues as criterial attributes in free-choice situations.

2. Short-term schizophrenics more frequently than nonpsychotic controls select tactual cues rather than visual cues as criterial attributes in free-choice situations.

These hypotheses were tested on 30 short-term schizophrenics, 30 long-term schizophrenics, and 30 nonpsychotic controls. All subjects were male, hospitalized

veterans.

The subjects were individually presented 20 sets of objects, each set containing (a) a standard object, (b) an object visually like the first but tactually different, and (c) an object tactually like the first but visually different. The subject was instructed to select, in each set, the object which seemed more like the standard object. Tactual cue preference was measured by the percentage of times the subject selected the object which was tactually, instead of visually, like the standard.

Intelligence, as measured by the Wechsler Adult Intelligence Scale vocabulary subtest, was not found to affect performance on the experimental task significantly.

It was found that both the short-term and the long-term schizophrenics made significantly greater use of contact cues than did the controls. The difference between the two schizophrenic groups was not significant.

It was suggested that the increased contact cue preference of schizophrenics may be operating in various features of this disorder, including pathologies in cognition and communication.

The technique used in this study bears some promise for future application in studies of other clinical groups and particularly for the study of the ontogenesis of cue preferences in the adult, normal as well as pathological.

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APPENDIX

Table 6

Age of Subjects

Control		Schizophrenic			
		Short-term		Long-term	
Subject no.	Age	Subject no.	Age	Subject no.	Age
7	22	11	24	10	21
13	25	21	25	1	26
11	29	6	28	4	30
24	29	22	30	9	30
25	29	10	31	11	33
29	31	7	32	13	33
3	35	2	33	26	36
2	36	3	33	28	36
26	37	1	36	3	39
6	39	5	36	29	39
30	39	8	36	7	40
8	40	4	38	15	40
9	40	19	39	25	40
19	44	9	41	16	42
28	44	14	42	8	43
18	45	23	44	12	47
21	47	17	45	21	47
12	49	25	47	2	48
17	49	30	48	5	49
22	57	20	55	14	56
5	58	24	58	24	57
20	60	28	58	30	60
16	62	26	60	23	63
23	62	18	62	17	64
15	63	16	63	18	65
27	63	15	63	19	65
14	64	12	65	22	66
10	67	13	65	27	68
1	68	27	68	6	70
4	68	29	67	20	71

Note.-The subject numbers refer to the subjects' ordinal position in the analysis of variance, as shown in Tables 8 and 9. The age matching was to help assure comparable ages for the groups as a whole and did not figure into the statistical analysis.

Table 7

Order of Presentation of Sets

Subject number	Order of sets
Control	
1	1 13 7 14 9 19 5 8 17 18 12 4 10 11 16 15 2 3 6 20
2	2 4 9 13 8 6 12 19 10 11 3 15 1 16 14 17 7 20 18 5
3	3 13 6 1 12 14 15 2 18 16 7 8 17 4 19 9 5 10 11 20
4	4 14 6 10 19 3 5 15 17 16 1 12 2 20 11 13 18 8 9 7
5	5 8 1 12 4 14 3 13 15 7 19 2 9 10 11 20 17 16 6 18
6	6 17 8 1 19 4 9 16 10 15 14 11 18 20 13 3 2 5 12 7
7	7 13 11 16 2 18 1 10 20 3 14 9 12 5 6 8 19 4 17 15
8	8 3 17 6 14 4 15 10 2 12 11 19 5 7 18 16 9 13 1 20
9	9 4 12 15 1 16 13 8 20 17 6 2 3 5 7 19 14 11 10 18
10	10 20 13 16 11 5 3 14 1 15 2 18 7 19 12 8 4 6 17 9
11	11 6 9 18 1 12 3 14 2 17 13 20 19 8 10 4 15 7 16 5
12	12 20 8 13 11 15 6 16 9 17 4 14 18 2 3 1 10 19 5 7
13	13 11 7 5 20 9 12 16 17 6 18 1 2 4 10 15 19 3 14 8
14	14 13 4 10 7 15 18 3 16 19 20 1 5 11 12 2 8 17 9 6
15	15 7 17 16 3 9 2 1 6 19 8 12 5 20 18 11 10 4 13 14
16	16 4 15 2 9 6 20 11 12 14 1 10 7 8 13 19 17 5 3 18
17	17 8 19 9 14 6 15 4 3 16 12 5 1 10 11 7 20 13 18 2
18	18 14 5 2 9 6 4 16 3 15 13 20 8 7 12 17 19 11 10 1
19	19 18 12 11 2 13 8 4 1 17 7 10 15 16 20 3 5 6 9 14
20	20 10 3 5 15 7 11 14 18 19 16 12 13 4 9 6 1 2 17 8
21	13 19 18 1 14 8 6 12 10 16 17 5 9 4 3 20 2 15 11 7
22	5 13 6 15 18 7 19 3 17 20 1 4 9 12 16 14 8 2 10 11
23	8 5 20 11 6 18 16 9 12 4 14 2 10 17 1 15 19 3 13 7
24	19 10 1 9 17 20 18 15 8 2 4 13 14 3 6 12 11 5 16 7
25	10 16 13 18 11 7 15 5 4 6 19 8 2 3 1 12 17 9 20 14
26	2 17 15 9 12 18 7 10 13 6 4 5 3 8 20 14 16 19 11 1
27	12 15 19 11 18 20 10 13 14 1 4 9 2 7 6 16 5 8 17 3
28	11 17 7 16 13 9 19 20 14 2 3 4 18 8 6 15 12 10 1 5
29	15 18 5 9 10 19 13 12 1 7 8 16 20 6 17 14 4 3 11 2
30	3 1 15 6 5 17 18 11 12 4 8 13 14 19 16 2 10 20 9 7
Short-term schiz.	
1	1 6 20 19 7 14 15 16 12 2 10 3 11 4 9 17 5 8 18 13
2	2 15 14 12 6 13 17 4 3 1 7 8 5 11 9 19 18 20 16 10
3	3 17 8 15 16 2 18 5 1 9 14 13 10 19 4 11 6 20 12 7
4	4 12 13 15 18 19 6 8 7 14 3 1 2 9 5 17 11 16 10 20
5	5 2 1 4 11 10 19 7 17 12 9 8 6 3 20 14 18 16 13 15
6	6 7 12 13 18 19 2 10 11 8 3 17 14 16 15 20 9 4 1 5
7	7 11 20 4 12 15 18 13 8 10 5 16 14 9 17 3 2 6 19 1

(Table 7 continued on next page)

Table 7--Continued

Subject number	Order of sets
8	8 16 2 20 12 5 14 6 10 9 1 13 4 19 15 18 3 11 7 17
9	9 2 12 13 16 6 20 17 18 1 11 4 15 7 8 10 5 14 3 19
10	10 13 18 17 1 9 7 3 16 6 2 4 8 15 14 5 12 19 11 20
11	11 8 6 2 1 17 4 15 18 13 7 16 10 9 19 3 12 5 20 14
12	12 17 9 4 1 8 15 20 18 7 16 3 6 13 10 11 14 2 5 19
13	13 9 17 2 15 12 5 10 8 20 14 3 18 16 1 4 7 11 19 6
14	14 20 17 12 3 2 16 5 11 18 9 7 6 10 8 19 4 13 1 15
15	15 7 14 17 1 8 13 16 3 10 6 2 5 19 12 4 20 9 11 18
16	16 18 13 19 8 15 12 14 1 17 7 3 6 20 2 11 4 5 10 9
17	17 13 20 19 4 14 8 7 11 10 1 6 2 5 3 12 18 15 9 16
18	18 6 7 4 16 11 3 20 1 8 9 5 14 19 12 10 15 17 2 13
19	19 16 2 9 6 20 8 13 3 7 15 4 10 12 18 5 1 17 14 11
20	20 17 1 15 14 5 3 6 7 8 12 2 10 11 9 16 18 13 19 4
21	3 10 9 15 7 18 1 8 13 17 11 4 12 19 14 16 5 20 2 6
22	16 14 2 12 11 13 1 9 19 3 5 6 4 18 10 8 17 7 20 15
23	19 3 14 5 13 9 7 2 15 11 12 6 18 17 10 16 1 4 8 20
24	8 3 12 9 19 10 20 6 4 5 11 18 17 16 7 13 14 1 15 2
25	6 12 5 20 19 3 8 2 4 16 17 11 1 14 13 15 7 9 10 18
26	1 15 6 14 9 4 8 17 13 7 3 18 11 10 19 2 20 12 5 16
27	18 15 5 11 7 1 2 12 19 8 6 17 3 10 20 16 9 14 13 4
28	17 6 3 2 1 18 12 7 10 20 13 4 5 15 8 16 11 9 14 19
29	4 10 9 7 14 20 2 1 17 6 12 18 15 5 13 8 19 16 11 3
30	20 16 7 1 10 6 4 17 8 5 12 18 11 3 15 13 2 14 9 19
Long-term schiz.	
1	1 8 18 2 17 3 14 20 10 11 9 6 7 12 16 4 5 19 13 15
2	2 16 11 13 20 6 19 5 10 1 15 3 4 7 17 8 14 9 18 12
3	3 12 13 15 11 20 1 2 10 7 14 9 5 16 17 18 19 8 6 4
4	4 2 6 11 13 10 8 16 19 14 1 9 5 3 18 12 20 15 7 17
5	5 11 12 20 15 6 4 3 7 16 17 10 9 2 19 8 18 14 13 1
6	6 7 1 4 20 19 2 10 3 16 12 13 8 9 18 5 17 14 11 15
7	7 11 13 5 15 8 9 12 2 4 19 3 14 10 1 18 20 16 6 17
8	8 19 20 18 7 13 6 11 9 10 3 1 4 16 15 2 17 14 12 5
9	9 11 7 16 13 18 6 20 4 19 17 10 12 8 14 15 3 5 2 1
10	10 6 17 8 1 11 4 14 16 12 9 3 7 2 15 19 20 13 5 18
11	11 15 3 4 9 18 10 16 14 1 6 17 8 13 19 2 7 5 12 20
12	12 7 9 11 18 10 19 20 13 16 15 6 5 2 8 3 1 17 14 4
13	13 2 5 12 6 18 19 3 16 10 8 4 20 15 17 9 1 14 7 11
14	14 1 6 11 7 2 3 13 18 10 16 19 20 4 9 5 12 15 8 17
15	15 5 17 18 16 1 3 19 6 9 20 10 11 2 8 4 13 7 14 12
16	16 3 4 18 11 9 10 15 14 1 19 6 8 12 13 17 2 7 5 20
17	17 11 3 8 20 10 1 19 18 14 6 2 7 15 13 5 9 16 4 12

(Table 7 continued on next page)

Table 7--Continued

Subject number	Order of sets
18	18 1 9 16 5 8 19 3 12 4 13 7 20 15 14 2 10 11 17 6
19	19 8 11 5 12 4 15 20 3 14 1 6 13 10 18 17 16 2 7 9
20	20 13 14 16 10 9 4 12 19 1 8 15 2 5 7 6 17 3 11 18
21	6 9 7 20 15 5 19 10 12 14 17 11 16 4 3 1 2 8 13 18
22	20 5 16 13 12 11 1 2 4 10 18 19 6 9 17 15 8 14 3 7
23	3 5 1 14 4 15 13 6 18 8 2 17 19 20 9 10 16 7 11 12
24	1 8 15 13 4 2 18 19 9 3 11 5 7 20 14 12 16 10 6 17
25	5 3 7 18 13 16 4 2 11 17 1 6 10 9 14 20 19 8 15 12
26	15 9 20 7 8 11 5 1 2 12 6 13 17 14 16 3 19 18 4 10
27	11 5 18 8 16 7 4 6 20 19 13 9 3 10 1 17 15 12 2 14
28	17 6 16 20 8 7 14 11 5 15 12 4 13 19 3 10 18 9 1 2
29	18 14 13 16 8 2 5 10 6 20 11 17 12 3 1 15 4 7 9 19
30	2 14 15 18 19 20 10 16 12 6 9 3 17 1 5 11 13 8 7 4

Table 8

Tactual Scores

Subject number	Control			Schizophrenic					
				Short-term			Long-term		
	Raw	Percentage	θ^a	Raw	Percentage	θ^a	Raw	Percentage	θ^a
1	5	25	30.0	17	85	67.2	13	65	53.7
2	10	50	45.0	20	100	90.0	20	100	90.0
3	5	25	30.0	16	80	63.4	19	95	77.1
4	0	0	00.0	17	85	67.2	0	0	00.0
5	16	80	63.4	19	95	77.1	11	55	47.9
6	10	50	45.0	20	100	90.0	8	40	39.2
7	11	55	47.9	12	60	50.8	20	100	90.0
8	5	25	30.0	10	50	45.0	16	80	63.4
9	11	55	47.9	12	60	50.8	15	75	60.0
10	11	55	47.9	20	100	90.0	13	65	53.7
11	0	0	00.0	1	5	12.9	11	55	47.9
12	0	0	00.0	7	35	36.3	1	5	12.9
13	18	90	71.6	12	60	50.8	11	55	47.9
14	11	55	47.9	18	90	71.6	11	55	47.9
15	5	25	30.0	16	80	63.4	2	10	18.4
16	4	20	26.6	20	100	90.0	20	100	90.0
17	3	15	22.8	9	45	42.1	16	80	63.4
18	4	20	26.6	13	65	53.7	12	60	50.8
19	10	50	45.0	0	0	00.0	6	30	33.2
20	20	100	90.0	15	75	60.0	2	10	18.4
21	12	60	50.8	18	90	71.6	15	75	60.0
22	6	30	33.2	10	50	45.0	14	70	56.8
23	6	30	33.2	0	0	00.0	0	0	00.0
24	0	0	00.0	20	100	90.0	14	70	56.8
25	7	35	36.3	18	90	71.6	15	75	60.0
26	3	15	22.8	1	5	12.9	19	95	77.1
27	0	0	00.0	20	100	90.0	0	0	00.0
28	14	70	56.8	13	65	53.7	20	100	90.0
29	8	40	39.2	16	80	63.4	1	5	12.9
30	11	55	47.9	12	60	50.8	17	85	67.2

[a]Refers to the inverse sine transformation value for the given percentage.

Table 9

Vocabulary Scores

Subject no.	Control		Schizophrenic			
			Short-term		Long-term	
	Raw	Scaled	Raw	Scaled	Raw	Scaled
1	32	9	65	14	2	0
2	50	11	23	7	26	8
3	47	11	25	7	17	5
4	23	7	71	16	52	11
5	49	11	51	11	54	12
6	22	7	40	10	23	7
7	23	7	40	10	47	11
8	31	8	60	13	16	5
9	17	5	59	13	6	0
10	16	5	62	13	21	6
11	29	8	45	10	12	4
12	24	7	47	11	37	9
13	49	11	42	10	28	8
14	18	6	20	6	18	6
15	56	12	44	10	32	9
16	10	3	35	9	47	11
17	34	9	19	6	35	9
18	60	13	48	11	48	11
19	47	11	60	13	21	6
20	44	10	49	11	21	6
21	46	10	24	7	24	7
22	44	10	42	10	54	12
23	47	11	65	14	11	4
24	14	5	26	8	31	8
25	30	8	38	9	15	5
26	54	12	64	14	15	5
27	27	8	14	5	38	9
28	32	9	32	9	24	7
29	28	8	23	7	16	5
30	26	8	31	8	4	0