CONCEPTUAL STRUCTURE IN THOUGHT-DISORDERED SCHIZOPHRENICS*

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INTRODUCTION

"THOUGHT-DISORDER" in schizophrenia was initially a psychiatric concept derived from clinical observation. As crystallized in standard psychiatric authorities, say Mayer-Gross, Slater and Roth (1954) the primary features of the talk (and inferentially the thinking) of thought-disordered schizophrenic patients are:

(*i*) Inconsequential following of side issues.

(*ii*) Tendencies for the thought to be directed by alliterations, analogies, clang associations, associations with accidents of the speaker's environment, symbolic meanings, and the condensation of several (perhaps mutually contradictory) ideas into one.

(*iii*) Words used out of context, e.g. concrete meanings taken where abstract meanings would be appropriate.

(*iv*) Clinging to unimportant detail.

(*v*) The use of laconic answers, e.g. I don't know, maybe, perhaps—indicative of emptiness and vagueness of ideas.

(*vi*) Thought is generally marked by gaps, poverty, indefiniteness and vagueness.

(*vii*) Indications of thought-blocking.

(*viii*) Indications of pressure of thoughts.

It should be noted that these represent abnormalities of form rather than content and thus are theoretically distinct from simply delusional talk. Moreover, "schizophrenia" itself appears to be a *disjunctive* concept and the diagnosis may, in practice, be applied to patients manifesting one or some but not necessarily all of the five major symptoms, as defined by say, Curran and Partridge (1955) these being thought-disorder, inadequacy or inappropriateness of affect, low volition, disturbances of motility and primary delusions. Thus in psychiatric practice "thought-disordered schizophrenics" seem to be regarded as a sub-group of the class of schizophrenics.

Four broad approaches have been made towards operationally defining the psychiatric concept of thought-disorder and subjecting it to experimental attack.

(i) "*Dissociation*"

This concept was primarily used by Kretschmer (1936) postulating that schizophrenic thinking is essentially marked by dissociation (*Spaltungsfähigkeit*)

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a tendency for mental activity to occur in isolation with a consequent fragmenting and lack of logical relationship between systems of ideas. The origin of this tendency was given in typological terms, i.e. two constitutional personality types (linked to the somatotypes leptomorphic and pyknic) were postulated, namely schizothymic (extreme manifestation schizophrenia) and cyclothymic (extreme manifestation manic-depressive psychosis). Experimental work generated by this thesis has been mainly of the dual task type; thus the subject might be given the task of memorizing the positions of coloured letters drawn on a card and at the end of the task be asked additionally to recall the colours in which the letters were drawn (a task not mentioned in the initial instructions). The appropriate prediction would be that schizophrenics would perform the dual task more competently (at least relative to the single task) than manic depressives (extreme "associaters") or normals since schizophrenics are, by nature, inclined to function dissociatively. This field of experimentation has been well reviewed by Payne (1954) who found that in a large number of tests of dissociation given to normals no factor of dissociative ability emerged. Bellak and Parcell (1946) investigated the pre-psychotic personalities of schizophrenics and could find no evidence indicating that the typological characteristics which Kretschmer postulated were a concomitant of schizophrenia. Moreover, the type of experimental design generally used seems to imply that since schizophrenics are inferior to normals in utilizing the logical relationships between systems of ideas they will be superior to normals in simultaneously utilizing systems of ideas which are not logically related. This seems a somewhat doubtful inference. Disorganized men do not necessarily flourish in a disorganized world.

(ii) "*Deterioration in Mental Efficiency*"

Babcock (1933) initiated an approach to the problem of schizophrenic thinking by categorizing it as a process of progressive mental deterioration particularly marked by slowness and inability to undertake new learning, due to organic causes analogous to those operating in senile and paretic conditions. This explanation was realized experimentally in the form of first measuring the level of "abstract intelligence" operationally defined as the subject's level on the Terman Vocabulary Test and assumed to represent old pre-illness learning; then measuring "mental efficiency" this being operationally defined as the subject's level on a series of mental efficiency tests, such as counting from 20 to 1, digit span, etc., this type of performance being taken to represent new learning and present level of function and to be markedly affected by deterioration of a schizophrenic type. The discrepancy between the two levels (termed the Efficiency Index) being the measure of deterioration. This approach can be adversely criticized for its unquestioned assumption that vocabulary level is a fair measure of pre-illness capacity—Yates (1956) has reviewed the difficulties implicit in this assumption and, more pertinently, the notion's validity as a *specific* explanation of the schizophrenic process is questioned by the work of Shapiro and Nelson (1955) and Campbell (1957) which indicates that loss of mental efficiency as defined by Babcock is a complex and very general phenomenon in mental illness manifesting itself in depressives, organics and even to some extent in neurotics as well as in schizophrenics.

(iii) "*Concretism*"

Implicit in the work of Vigotsky (1934) Bolles and Goldstein (1938) and others which form the focus of the Kasanin (1946) symposium, is the idea that

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schizophrenic thinking is essentially concretistic and marked by inability to form abstractions. Operationally "abstraction" is usually defined in terms of a subject's ability to group and categorize objects in object-sorting tests (e.g. grouping blocks by form, colour, size, weight, etc.) or ability to give the meanings of proverbs in terms of acceptable generalizations. Examples of work critical of this approach are Rapaport, Gill and Shafer (1945) who found the tendency to be for schizophrenics to produce unusual generalizations rather than to fail to abstract and Hunt and Jones (1958) who showed that when trained clinicians used the dimensions "schizophrenia", "intelligence", "communicability" and "concrete-abstract" to scale schizophrenic vocabulary responses "concrete-abstract" scaling had the lowest interjudge correlation and correlated insignificantly and *negatively* with the scale "schizophrenia". Experimental work on "concretism" is reviewed in relation to comparative experiments utilizing "over-inclusion" theory by Payne, Matussek and George (1959).

(iv) "*Over-inclusion*"

The most recent attack on the problem derives, in part, from the suggestion by Cameron (1938) that schizophrenics are unable to preserve the conceptual boundaries of a task and thus include in the data before them such a variety of categories that specific problems become too extensive and too complex for a solution to be reached. This suggestion has been steadily developed by workers such as Lovibond (1954) until it has now been very explicitly formulated by Payne, Matussek and George (1959) in the following terms:

> "Concept formation can be regarded as largely the result of discrimination learning. When a child first hears a word in a certain context, the word is associated with the entire situation (stimulus compound). As the word is heard again and again, only certain aspects of the stimulus compound are reinforced. Gradually the extraneous elements cease to evoke the response (the word) having become "inhibited" through lack of "reinforcement". This inhibition is in some sense an active process, as it suppresses a response which was formerly evoked by the stimulus. "Over-inclusive thinking" may be the result of a disorder of the process whereby "inhibition" is built up to "circumscribe" and "define" the learned response (the word or "concept"). In short it could be an extreme degree of "stimulus generalization".

Exemplary experimental work can be found in Zaslow (1950), Moran (1953) and Epstein (1953).

Without attempting in detail to evaluate the experimental work arising from these four approaches, it can be argued that all of them are limited in that they describe the schizophrenic *condition* rather than define the schizophrenic *process*. Ultimately each rests upon some kind of constitutional or typological or undefined organic assumption so that the question of causal factors is by-passed. By-passed, that is, if we accept the view that such assumptions are fundamentally tautological. Moreover, these explanations do not refer back to the clinically observed behaviour upon which the concept of schizophrenic thought-disorder was originally based.

Personal Construct Theory

In an attempt to utilize a theoretical orientation which would not only operationally define the nature of schizophrenic thinking but would generate hypotheses as to the causal factors involved and which would comment

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specifically on the broad behavioural manifestations of schizophrenic thought-disorder, the work to be described was carried out within the framework of Personal Construct theory as proposed by Kelly (1955).

The theory is based firmly on the assumption that all men may be thought of as "scientists" in the sense that each is concerned with the prediction and control of his environment. Further each individual seems to develop his own personal repertoire of constructs by means of which he structures (conceptualizes) his world and tries to anticipate events. These constructs may be thought of as the elements of a system by which the individual codifies his experience. Thus the psychology of personal constructs is concerned with the ways in which personal construct repertoires can be described in generalized terms and to account for the ways in which they develop and change and the ways in which they can be utilized in accounting for individual behaviour.

The theory involves postulating a personal construct system for each individual, a complex series of related "goggles" through which an individual views reality. The notion of process hinges on the idea that construing is a biologically purposeful process whereby an individual seeks to anticipate events. A construct is not merely a label, it is in essence a prediction. To construe a business as profitable or a woman as affectionate is to predict future events in relation to the elements construed and predictions are inevitably validated or invalidated or events prove the prediction to have been irrelevant, i.e. the events turn out to be outside the range of convenience of the constructs used. It is in the individual's reaction to the emerging validational situation that the theory expects the process of change to subsist.

The three elements of the term "personal construct system" stress firstly that individual differences (in terms of varying validational experience) must be postulated as an integral part of the theory and their parameters described. Secondly, that a construct (as distinct from the older term concept) is a predictive instrument and thirdly that constructs are hierarchically related and systematized.

Kelly formally presented his theory as a fundamental postulate and eleven elaborative corollaries. Space does not permit a detailed account or discussion of the theory here but it should be understood that the terms of reference of the experimental work to be described are derived from this theoretical framework.

Repertory Grid Testing

Kelly defined a "construct" as "a way in which two things are alike and by the same token different from a third". In order to elicit and examine verbal constructs he and his associates developed the technique of repertory grid testing. The assumption underlying all forms of repertory grid testing is that conceptual relationships can be usefully inferred from statistical associations in usage. Thus, isolating a single extreme example, if a subject nominates 40 people known personally to him and categorizes each in turn as MORAL (emergent pole) or NOT MORAL (implicit pole) and HONEST or NOT HONEST and we find that the 20 designated as HONEST are also designated as MORAL and the 20 designated as NOT HONEST are designated as NOT MORAL, then we can infer a high positive relationship (which can be measured in terms of its binomial probability) between the concepts HONEST and MORAL.

A variety of forms of the repertory grid test have been devised and used, e.g. Landfield (1955) and Levy (1956) but the particular elaboration of the basic technique used in the work to be described was designed for this experiment and so far as is known no comparable data are available from other studies.

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Experiment

The following is a summary of work fully described in Bannister (1959).

Experimental Population

Normals: 20 adult normals (adult=age 17+), subjects never having been hospitalized for mental illness, treated for mental illness or officially diagnosed as mentally ill.

Thought-disordered schizophrenics: 8 adults, at time of testing patients in a mental hospital, firmly diagnosed as schizophrenic and adjudged to be thought-disordered by the psychiatric consultants responsible for them.

Non-thought-disordered schizophrenics: 12 adults, at time of testing patients in a mental hospital, firmly diagnosed as schizophrenic but not adjudged to be manifesting signs of thought-disorder by the psychiatric consultants responsible for them.

Neurotics: 10 adults, at time of testing patients in a mental hospital, firmly diagnosed as suffering from one of the psychoneuroses (e.g. anxiety states, hysterias and so on) by the psychiatric consultants responsible for them.

Depressives: 10 adults, at time of testing patients in a mental hospital, firmly diagnosed to be suffering from either a reactive or an endogenous depression by the psychiatric consultants responsible for them.

Note: The term "schizophrenics" in the ensuing report refers always to non-thought-disordered schizophrenics.

Extraneous Variables

Four extraneous variables might reasonably be thought to have an effect upon performance in tests involving verbal judgments namely, age, sex, intelligence and social status. These were dealt with as follows:

Age: There were no significant differences between the means or variances of any of the five groups.

Sex: Two of the psychiatric groups had unequal sex distribution and all test scores were examined by sex groupings. There were no significant differences and sex as a variable seemed to have no appreciable effect.

Intelligence: The measure of intelligence used was the Mill Hill Vocabulary Scale Form 2, Section A (pro-rated). There were no significant differences in either means or variances between any of the groups.

Social Status: This was defined in terms of the occupation and education of the subject and the occupation of the subject's immediate family according to the scale suggested by Belson (1955). There were some significant social status differences between certain groups but these did not correspond with significant differences on any test measures shown in the final results.

It seems clear that none of the extraneous variables which have been taken into account can fairly be said to account for differences in test performance found between groups.

Test Administration

1. The subject was asked to write down on 36 cards the names of 36 adult (age 17+) people known personally to him. It was explained that they might be people of any kind, liked or disliked, present or past acquaintances, but they must have been personally known to the subject.

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2. The 36 cards were thoroughly shuffled by the subject, and numbered serially 1 to 36. The subject was asked to put cards 19 to 36 on one side, and spread cards 1 to 18 out in front of him with the names upwards.

3. The subject was given a card with the word LIKEABLE written on it and asked, using the word in his personal sense, to write down the numbers (not the names) of the *nine* most likeable people out of the 18 before him. The experimenter had before him a grid with the numbers 1 to 18 along the top and the numbers 1 to 10 down the side. The numbers 1 to 18 represented the like numbered 18 cards, bearing the names of people being considered by the subject. Along the first row of the grid, the experimenter entered a tick in the cells of the 9 people out of the 18 nominated as most likeable.

4. The experimenter then presented the subject with a second card with the word SERIOUS written on it, and the procedure described in paragraph 3 was repeated, the cards being divided half and half.

5. The experimenter entered a tick in the cell representing each person nominated as among the 9 most "serious" in the second row of the grid. This procedure was repeated with cards 1 to 18 for the emergent poles of 10 constructs as follows:

1. LIKEABLE	2. SERIOUS	3. PREJUDICED	4. GOOD	5. AGGRESSIVE
6. LAZY	7. SINCERE	8. UNEDUCATED	9. RELIGIOUS	10. UNRELIABLE

6. The subject was now asked to put cards 1 to 18 on one side and scatter cards 19 to 36 in front of him. He was then asked to sort these using the ten emergent poles of constructs previously given to him, in exactly the same way and order as described for the first set. The responses were recorded in identical manner on a second grid.

Test Measures—Scoring and Rationale

From each subject's protocol the following data are first extracted and represent the raw material from which all four test scores are derived. The procedure is exemplified by reference to Table I which represents the first three lines of Grids A and B for one subject. X represents a tick and O represents a blank.

TABLE I

Sample Part of Recorded Grids

Grid A

People																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
X	O	O	X	O	X	X	O	O	O	X	O	X	X	O	X	O	X	1	CONSTRUCTS
X	O	X	O	X	X	O	O	X	X	X	O	O	O	O	O	X	X	2	
O	X	X	X	X	O	O	O	X	X	O	O	O	O	X	X	X	O	3	
																		to	
																		10	

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TABLE I—*continue*

Grid B

People

19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		
O	X	X	O	O	O	X	O	X	O	X	X	O	O	X	O	X	X	1	CONSTRUCTS
X	X	X	X	O	O	O	O	X	O	O	X	X	O	O	O	X	X	2	
X	O	X	X	X	O	O	X	O	X	X	O	O	X	O	X	O	O	3	
																		to	
																		10	

Matching Score, Grid A

Each line in Grid A (people 1 to 18) is compared with every other line and a matching score noted—two ticks coinciding (vertically) represent a match, two blanks coinciding represent a match, tick and blank or blank and tick is no match; thus in Table I

For lines 1–2 Grid A matching score is 8
For lines 1–3 Grid A matching score is 4
For lines 2–3 Grid A matching score is 10

Matching Score, Grid B

Each line in Grid B (people 19 to 36) is compared with every other line and a matching score noted—matching criteria as for Grid A. Thus in Table I

For lines 1–2 Grid B matching score is 12
For lines 1–3 Grid B matching score is 4
For lines 2–3 Grid B matching score is 6

Total Matching Score

The matching score for each pair of lines in Grid A is added to the matching score of the equivalent pair of lines on Grid B, and the deviation (plus or minus) from a chance expectancy of 18 is noted. Thus, in Table I

The total matching score for lines 1–2 is $+2$ ($8+12=20$: $20-18=+2$)
The total matching score for lines 1–3 is -10 ($4+4=8$: $8-18=-10$)
The total matching score for lines 2–3 is -2 ($10+6=16$: $16-18=-2$)

Split Matching Score

The deviation of the matching score of each pair of lines on Grid A from chance expectancy on Grid A (that is 9) is added to the deviation of the matching score of the equivalent pair of lines on Grid B (that is 9) *regardless of sign*, and this addition represents the split matching score. Thus in Table I

Lines 1–2 split matching score is 4 ($8-9=-1$ $12-9=3$: $1+3=4$)
Lines 1–3 split matching score is 10 ($4-9=-5$ $4-9=-5$: $5+5=10$)
Lines 2–3 split matching score is 4 ($10-9=1$ $6-9=-3$: $1+3=4$)

The difference between the two measures lies in the fact that a total matching score treats the two grids as a unit, and thus if the direction of the relationship is reversed (plus to minus) the relationship will tend to cancel itself out, while a split matching score treats the two grids as separate units and makes

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relationships in either direction (positive or negative) additive regardless of sign.

Thus, for each subject, initial raw data covering comparisons of the 45 possible pairs of lines (from 10 lines) is extracted, and laid out as exemplified in Table II.

TABLE II

Sample Part of Raw Data Table Derived from Recorded Grids

	Matching Score Grid A	Matching Score Grid B	Total Matching Score	Split Matching Score
Lines 1–2 ..	8	12	+2	4
1–3 ..	4	4	−10	10
to 1–10				
2–3 ..	10	6	−2	4
to 9–10				

Rationale of Matching Scores

The rationale of the type of matching score described is relatively simple. If a subject describes one person as being both SINCERE and GOOD we cannot, from this one sample of the subject's behaviour, infer anything about the relationship between the terms SINCERE and GOOD for him. However, if in describing a large number of people there appears a persistent tendency for him to describe SINCERE people as GOOD then the binomial probability of this occurring by chance becomes increasingly remote and we are increasingly justified in inferring that for the subject there is some kind of conceptual relationship between the terms SINCERE and GOOD. Thus a matching score derived from a number of yes-no categorizations in the manner described, is a form of correlation coefficient (or more nearly chi square) measuring the tendency for the terms to be associated or to occur independently or for one to occur repeatedly in the absence of the other (negative association or correlation). From this tendency to asssociation we infer structure and it is precisely the nature of this structure which Personal Construct theory attempts to define and describe.

In this experiment each subject is supplied with the same 10 constructs and he sorts the 36 people known personally to him in terms of the 10 bipolar scales suggested to him by the construct labels supplied. The use of matching techniques enables us to compare each pair of constructs in turn and to assign to the comparison a numerical value which ranges from no matchings (taken to indicate that the two labels are exact opposites) through matchings around chance level (taken to indicate that there is no manifest relationship between the construct poles labelled) on to complete matching (taken to indicate exact equivalence for the subject of the two construct pole labels).

FOUR DERIVED MEASURES

CONSISTENCY OF RELATIONSHIP

(a) *Scoring*

Reference to Table II shows that for each of the 45 pairs of constructs two matching scores are available, one from Grid A and one from Grid B. For each subject a Pearson Product Moment correlation coefficient is run between the pairs of readings (matching scores) for the 45 pairs of constructs. The square of this correlation coefficient multiplied by 100 is the Consistency of Relationship score.

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(b) *Rationale*

If matching scores derived in the manner described reflect structure, and if as personal construct theory suggests, a relatively *stable* structure is characteristic of construing systems, then we would expect a significant positive correlation between matching scores (structural pattern) on Grid A and equivalent matching scores (structural pattern) on Grid B, allowing that is, for the attenuating effect of using smaller numbers of "objects" (people) as the sample to be construed in each of the grids. We would consequently expect failure to achieve such a significant positive correlation in test performance to be associated with pathological processes. It should be noted that the term "allowing for the attenuating effect" means allowing in argument; no actual correction for attenuation has been used in the statistical computation of results since the attenuating effect is equal for all subjects; it will affect the absolute but not the relative values of the scores.

In fact, as will be seen when results are reported, of the 60 subjects used in the main experiment, the consistency of relationship correlation coefficients of 47 were significant at beyond the 1 per cent. level 2 tail; those of 3 were significant beyond the 5 per cent. level 2 tail; those of 8 were positive but not significant; those of 2 were negative but not significant (both the latter were thought-disordered schizophrenics).

Since correlation coefficients are not linearly related they are unsuitable for direct use as scores. Therefore, they have been squared and multiplied by 100 to give "variance in common" scores which are linearly related.

It should be noted that the coefficient of correlation derived here is not the equivalent, say in intelligence testing, of a test-retest reliability coefficient since virtually no time elapsed between the making of the judgments recorded in Grid A and the making of the judgments recorded in Grid B. Nor does it resemble the split-half reliability coefficient since matching scores on Grid A reflect comparisons made by the subject of the people on Grid A and matching scores on Grid B, separately and independently reflect comparisons made by the subject of the different people included in Grid B. There is no equivalent here of the extraction say, of odd and even numbered questions from a unitary test, such as is commonly carried out in split-half reliability tests. If the correlation used here has any kinship with correlations used in standardizing intelligence tests, it is with the "equivalent form" type of correlation, where two forms of the intelligence test, equated as far as possible for difficulty level are given to the same subject often with the clinical aim of detecting pathological process.

The measure of Consistency of Relationship assesses something which might, by many psychologists, be termed stability or even rigidity in conceptualization.

Intensity of Relationship

(a) *Scoring*

A subject's intensity of relationship score consists simply of the total of his split matching scores, the derivation of which has already been given with reference to Tables I and II.

(b) *Rationale*

The rationale of the intensity of relationship score is essentially the same as the rationale of matching scores themselves; the deviation of matching scores

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from chance level is taken to indicate relationships between constructs, by inference conceptual structure; the degree of this deviation is taken as an index of the strength of relationships and, by inference, strength of conceptual structure.

Coefficient of Variation

(a) *Scoring*

For each of the ten constructs in a subject's protocol, a construct matching score is computed. This is simply the total of the construct's total matching scores (see Tables I and II and related text) with the *other* 9 constructs, these being added together regardless of sign. The standard deviation of these 10 construct matching scores is then calculated (using small sample standard deviation formula) and using Karl Pearson's formula, a coefficient of variation is derived, as follows:

Karl Pearson's Coefficient of Variation formula

$$\frac{100 \times \text{S.D.}}{\text{X}} = \text{per cent.} = \text{Coefficient of Variation}$$

This coefficient of variation (which is in the form of a percentage) is what is meant by a subject's Coefficient of Variation score.

(b) *Rationale*

The question of why an individual's construct relationships should weaken is to be speculatively discussed later but it is assumed that when such a weakening process takes place its effect is not necessarily equally distributed between all constructs. Since constructs themselves are often constellated into hierarchies and sub-systems, some construct relationships may weaken more rapidly than others and some constructs within a personal construct system may thus lie within a very weak network of relationships, while others occupy a position in what is still a relatively strong network of relationships. From this it is argued that subjects who are undergoing a general process of weakening in terms of construct system structure will show, within any sample of constructs, a tendency to greater variability in strength of construct relationships. The Coefficient of Variation score is designed to measure precisely this variability.

It was decided not to use a simple measure of variance (such as the standard deviation) since it was found that (as is often the case) the lower a subject's absolute scores were, the lower his variance tended to be. For schizophrenic subjects in the main experiment, the correlation between the standard deviation of subject's construct scores and Intensity of Relationship scores was $+\cdot 462$. The use of the coefficient of variation formula enables us to partial out the effect of the absolute size of raw scores and to measure the relative variability of subjects' matching scores independently of the absolute size of the matching scores themselves.

Social Deviation

(a) *Scoring*

The mean of the total matching scores of the 20 normal subjects for each pair of constructs is a criterion for this measure. The actual means, to the nearest whole number, are shown in Table III. The Social Deviation score is simply the

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TABLE III

Mean of 20 Normals (Total Matching Scores) for 10 Constructs. Main Experiment

	Like-able	Seri-ous	Preju-diced	Good	Aggres-sive	Lazy	Sin-cere	Unedu-cated	Reli-gious	Unre-liable
1. Likeable ..		+2	−7	+10	−6	−3	+7	−4	+3	−6
2. Serious ..			−1	+3	−1	−4	+4	−4	+3	−4
3. Prejudiced				−6	+7	+4	−5	+3	−2	+5
4. Good ..					−8	−4	+11	−4	+5	−8
5. Aggressive..						+3	−6	+2	−3	+6
6. Lazy ..							−5	+4	−2	+6
7. Sincere ..								−5	+5	−8
8. Uneducated									−2	+5
9. Religious ..										−4
10. Unreliable										

total of the discrepancies between the subject's total matching score on each pair of constructs and the mean matching score of the same pair of constructs as derived from the 20 normal subjects and shown in Table III. The higher the total of the discrepancies the greater is (assumed to be) the deviation from social usage.

(b) *Rationale*

If we assume that the mean of the 20 normals broadly represents the *public* relationship between each pair of constructs, then the discrepancy between a particular individual's scores and this representative mean is a measure of the degree to which the subject is idiosyncratic in his usage relationship for a particular pair of constructs. If we assume that the 10 constructs measured are a fair sample of constructs used in the sub-system of constructs about people, then the total discrepancy will fairly reflect the tendency of the individual to be like or unlike the majority of his fellows in his construct relationships.

Admittedly, in computing this score for a normal subject, then we are noting a discrepancy between an individual score and a mean score to which that individual has contributed, whilst when we are computing the discrepancy for an individual psychiatric subject, we are noting the discrepancy between an individual score and a mean score to which the individual has not contributed. However, since the means are the means of 20 subjects, it is not thought that the final results will be in any significant degree biased by this factor.

HYPOTHESES AND RESULTS

Working within the framework of a novel theory and technique and attempting to discriminate between groups very broadly differentiated on a diagnostic basis, hypotheses are necessarily general and partake of the character described in gunnery circles as "bracketing the target". Two broad considerations affected the hypotheses, firstly it was decided to predict identical positions on the various continua for both schizophrenic groups, since there was prior to testing no evidence that their diagnostic separation in any way corresponds with the types of operational distinction being made; to treat neurotics and depressives in terms of prediction as a single group since although they differ from schizophrenics in broad behavioural terms, they equally differ from normals in being "abnormal": to treat the normal controls as a third group for predictive purposes. Secondly, although Kelly proposed personal construct theory as an elaborate description of *normal* behaviour he did make specific comments in the light of his theory about various psychological abnormalities and with reference to schizophrenia he suggested that it was

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characterized essentially by "loosened construing". A loose construct in terms of his theory is defined as a construct which leads to varying predictions but which retains its identity. It can be argued that the varying predictions of a loose construct are consequent upon the construct having weak relationships with surrounding constructs in the hierarchical system; its predictions are not made specific or focussed by a constellation of associated construing patterns.

Specific hypotheses and results are given for each measure in turn.

Consistency of Relationship

It was predicted that all schizophrenics would have low consistency scores and be significantly differentiated from normals with middle range scores who in turn would be significantly differentiated from neurotics/depressives with high range scores.

Table IV

Consistency of Relationship—Group Means and Standard Deviations

Group	Normals	Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics	Neurotics	Depressives
Mean	36	10·25	29·42	46·50	31·70
S.D.	21·669	12·450	23·919	17·78	18·262

Levels of "t" (uncorrelated Means)

Groups	Thought-Disordered *v.* Non-Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Neurotics	Non-Thought-Disordered Schizophrenics *v.* Neurotics
"t"	5% level	N.S.	1% level	0·1% level	5% level 1 tail
	t=2·160		t=2·876	t=5·11	t=1·869

	Normals *v.* Neurotics	Thought-Disordered Schizophrenics *v.* Depressives	Non-Thought-Disordered Schizophrenics *v.* Depressives	Normals *v.* Depressives	Neurotics *v.* Depressives
"t"	N.S.	2% level t=2·829	N.S.	N.S.	N.S.

A summary of the hypothesis and results of this measure are shown below a clear *horizontal* break in the print represents a significant difference in group *mean* position. This convention is used throughout

Hypothesis:

All Schizophrenics — Normals — Neurotics/Depressives

Result:

Thought-Disordered Schizophrenics — Depressives/Normals

Schizophrenics — Neurotics

Low ←——————— Consistency ———————→ High

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It should be noted that only two groups differed significantly in score distributions (F ratio). Thought-disordered schizophrenics were significantly (5 per cent. level) more homogeneous in scores than non-thought-disordered schizophrenics whose scores were widely scattered.

Intensity of Relationship

The hypotheses here were identical with those made for the Consistency of Relationship measure.

Table V

Intensity of Relationship—Group Means and Standard Deviations

Group	Normals	Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics	Neurotics	Depressives
Mean	281·65	209·62	258·66	284·7	242·2
S.D.	78·917	27·308	54·792	57·74	49·234

Levels of "t" (Uncorrelated Means)

Groups	Thought-Disordered *v.* Non-Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Neurotics	Non-Thought-Disordered Schizophrenics *v.* Neurotics
"t"	5% level t=2·331	N.S.	1% level 1 tail t=2·498	1% level t=3·374	N.S.

	Normals *v.* Neurotics	Thought-Disordered Schizophrenics *v.* Depressives	Non-Thought-Disordered Schizophrenics *v.* Depressives	Normals *v.* Depressives	Neurotics *v.* Depressives
"t"	N.S.	N.S.	N.S.	N.S.	N.S.

A summary of hypotheses and results is shown below

Hypothesis:

All Schizophrenics — Normals — Neurotics/Depressives

Result:

Depressives

Thought-Disordered Schizophrenics — Schizophrenics/Normals/Neurotics

Low ←——————Intensity——————→ High

Here again thought-disordered schizophrenics had relatively homogeneous scores differing in this respect significantly from normals (5 per cent. level).

Coefficient of Variation Measure

The hypothesis here was that all schizophrenics would show high variability in construct relationship strength, normals medium range variability and neurotics and depressives low variability with significant differences between the three clustered groups. The argument being that the progressive weakening

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of the strength of construct relationships in schizophrenics would, since constructs cannot be assumed to be weakening at identical rates, lead to greater variability than normal.

TABLE VI

Coefficient of Variation—Group Means and Standard Deviations

Group	Normals	Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics	Neurotics	Depressives
Mean	29·60	26·04	30·12	31·52	37·957
S.D.	6·58	11·314	8·67	4·12	6·160

Levels of "t" (Uncorrelated Means)

Groups	Thought-Disordered *v.* Non-Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Neurotics	Non-Thought-Disordered Schizophrenics *v.* Neurotics
"t"	N.S.	N.S.	N.S.	N.S.	N.S.

	Normals *v.* Neurotics	Thought-Disordered Schizophrenics *v.* Depressives	Non-Thought-Disordered Schizophrenics *v.* Depressives	Normals *v.* Depressives	Neurotics *v.* Depressives
"t"	N.S.	2% level t=2·857	5% level t=2·397	1% level t=3·340	2% level t=2·745

Summary of results and hypotheses is given in print form below

Hypothesis:

All Schizophrenics — Normals — Neurotics/Depressives

Result:

Depressives — Neurotics/Schizophrenics/Normals/Thought-Disordered Schizophrenics

High ←——————————Variability——————————→ Low

SOCIAL DEVIATION

Since the general approach argues that all forms of disordered behaviour will be associated with disorders in construing it was hypothesized here that all psychiatric groups would have significantly higher social deviation scores than the normal group.

TABLE VII

Social Deviation Score—Group Means and Standard Deviations

Group	Normals	Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics	Neurotics	Depressives
Mean	150·85	156·25	184·50	152·0	175·1
S.D.	40·35	33·779	55·154	43·91	42·031

Levels of "t" (Uncorrelated Means)

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Groups	Thought-Disordered *v.* Non-Thought-Disordered Schizophrenics	Non-Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Normals	Thought-Disordered Schizophrenics *v.* Neurotics	Non-Thought-Disordered Schizophrenics *v.* Neurotics
"t"	N.S.	5% level 1 tail t=2·014	N.S.	N.S.	N.S.

	Normals *v.* Neurotics	Thought-Disordered Schizophrenics *v.* Depressives	Non-Thought-Disordered Schizophrenics *v.* Depressives	Normals *v.* Depressives	Neurotics *v.* Depressives
"t"	N.S.	N.S.	N.S.	N.S.	N.S.

A summary of hypotheses and results in print form is shown below

Hypothesis:

Normals — Neurotics/Depressives/All Schizophrenics

Result:

Neurotics/Thought-Disordered Schizophrenics/Depressives

Normals — Schizophrenics

Low ←——————Social Deviation——————→ High

Assessment of Results

The broad picture which has been implied of differences between diagnostic groups in terms of measures of construing is inconsistent with results in three major respects.

(*i*) Schizophrenics do not appear to be a homogeneous group. Thought-disordered schizophrenics behave in relation to the Intensity and Consistency of Relationship measures as predicted and thereby are significantly differentiated from non-thought-disordered schizophrenics and other groups. On the other two measures although thought-disordered and non-thought-disordered schizophrenics are not significantly differentiated they do have other groups occurring on the continua between them.

(*ii*) Depressives and Neurotics do not appear as a single group on any measure and Depressives appear distinct from all other groups on the Coefficient of Variation measure. The argument used to support the original hypothesis that schizophrenics would have significantly high variability may well have been at fault in relation to thought-disordered schizophrenics at least in that this group has construct relationships which have weakened to their asymptote thus manifesting very low variability. In terms of construct theory and what is known of the Depressive diagnostic group the present author can advance no explanation which would account for the singular position of depressives on the Coefficient of Variation measure.

(*iii*) While neurotics tended to have the position above normals which was predicted for them, they were not significantly differentiated from normals. The Social Deviation measure is in general a poor discriminator and although Non-thought-disordered schizophrenics are differentiated from Normals by

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their social deviation scores, there is no evidence that all psychological abnormalities as such are necessarily associated with a *socially deviant* pattern of construct relationships.

With regard to the value of the approach as a whole, since Kelly argued that behaviour is a function of construing it could be inferred from this that groups categorized for broad behavioural differences (psychiatric diagnoses) would show differences on measures of construing. Kelly also argued that major aspects of construing could be measured by using techniques derived from the matrix of constructs (the repertory grid) suggested by the theoretical concept of "constructs". From this position it could be argued that if the construing patterns of a number of groups broadly differing in behaviour were measured, then a number of significant differences in various aspects of construing would appear between the groups. In general, this expectation is borne out. Moreover, within the limits of the single experiment and accepting the need for replication, the results suggest that it is possible operationally to define schizophrenic thought-disorder in terms of weakened construct relationships as measured by this form of repertory grid technique, and indicate that this phenomenon could be isolated both between diagnostic categories and within the overall category of schizophrenia.

It must be stressed that although significant differences were manifest in terms of broad diagnostic labels and in terms of the phenomenon of "thought-disorder" the measures did not relate significantly (nor where relations predicted) with other psychiatric classifications of schizophrenics such as the classic paranoid-catatonic-hebephrenic-simple groupings.

It should be noted with regard to the question of the independence of the various measures derived from the form of repertory grid test used that the measures Consistency of Relationship and Intensity of Relationship correlate positively for all groups (Spearman's rho) with a mean correlation of $+\cdot 630$. No other pair of measures show consistent direction of correlations over the five groups so that it appears, in practice, that there are three clearly independent measures within the four cited. However, it should be noted that although the two measures mentioned correlate significantly, the discrimination they give between thought-disordered schizophrenics and members of other groups is *improved* when they are added together, thus the discriminating variance of the two measures may not be entirely held in common.

Sub-Experiment

In order briefly to examine the relationship between construct matching scores (as defined in the main experiment reported) and what is popularly meant by "meaning" the following experiment was carried out. Ten normal subjects (a different group from the one used in the main experiment) were given the ten terms used in the main experiment and asked under each term to list the other nine as follows: "Put first the one nearest in *meaning* to the heading term, then the second nearest in *meaning*, working down to putting finally the one which is most opposed in meaning". Thus each subject presented 10 rankings, one for each term and there being ten subjects there was a total of 100 rankings. The terms were then ranked according to the order indicated by the mean matching scores of the 20 normal subjects of the main experiment. Thus under "LIKEABLE" was placed the term with the highest positive matching score (i.e. GOOD) then the term with the next highest positive matching score (i.e. SINCERE) down to the term with the highest negative matching score (i.e.

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PREJUDICED); similarly for each of the ten terms. It was then possible to run rank order correlations between each list of terms as ranked by test quantification and as ranked by each of the ten normal subjects instructed to order by "meaning". "One tail" tests of significance were used since a positive correlation would always be predicted. Using the levels of significance for rank order correlations given by Siegel (1956) the results of this sub-experiment are given in Table VIII.

TABLE VIII

Positively significant at 1 per cent. level	54
Positively significant at 5 per cent. level	30
Positive but not significant	13
Negative but not significant	2
Negatively significant at 5 per cent. level	1

The implication is clearly that a construct relationship (as operationally defined in terms of matching scores) is akin to "meaning" and the relationship of this measure of meaning to Osgood's (1957) semantic differential in likewise manifesting an overall GOOD-BAD "factor" is discussed in Bannister (1959).

THE SCHIZOPHRENIC PROCESS

Current theories concerned with schizophrenic thought-disorder were adversely criticized on the grounds that they are purely *descriptive* and do not suggest a mechanism for the condition which they describe. If we accept for the sake of argument that weak construct relationships in the sense in which they have been here experimentally demonstrated are central to schizophrenic thought-disorder, then we can refer to construct theory as a whole for possible hypotheses concerning process. The line of thought which immediately suggests itself hinges on the idea that changes in construct systems are related to their validational history. For example, if the construing of a person as "loving" is invalidated, then the tendency may be to construe the person in the contrast pole as "hating", but the acquaintance may then exhibit behaviour more appropriate to the "loving" pole and we may duly shuffle him back to be construed under that pole. However, if invalidation occurs in this manner repeatedly, the tendency may be to regard the construct as in itself inadequate to subsume the elements (behaviour of the acquaintance) under consideration and may itself be, in some way, modified. This modification could take the form of loosening the construct, that is to say, weakening its relationships with other constructs, so that it leads to varying predictions (the definition of a loose construct). Thus *loosely* to construe a person as "loving" would *not* be automatically to anticipate from him "sincere" and "likeable" and so on behaviour, since the relationships between the constructs normally constellated with "loving" have been weakened. In this way, the construct would be damaged as a predictive instrument since it would lead to varying predictions but it would be strengthened as an explanatory instrument, since *post hoc* it would be capable of covering events.

Naturally this type of explanation would have to be elaborated to account for interaction effects once parts of a construct system had become weakened and to set up parameters for the change process as a whole. However, construct theory does appear to contain the postulates and terminology necessary for this kind of causal analysis and since invalidation could be produced in a laboratory setting and since in repertory grid techniques we have an instrument

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potentially capable of measuring construct changes of various kinds, then hypotheses set up from this source should prove testable.

The Clinical Signs of Schizophrenic Thought-Disorder

The characteristics of the talk of thought-disordered schizophrenics which gave rise to the psychiatric concept of thought-disorder in schizophrenia, have already been given in the terms used by Mayer-Gross, Slater and Roth (1954). In terms of loosened construing, as defined in the present work, can these particular characteristics be at all accounted for?

(*a*) The first characteristic is "inconsequential following of side issues". As has already been pointed out, the whole idea of relevance seems to be related to the idea of structure and relationships in constructs; if we are talking about politics then we utilize the whole construct sub-system which we have developed to subsume elements normally thought of as political. If relationships between constructs and between construct sub-systems have been loosened, i.e. weakened, then the *focusing* and *restricting* effect of the construct sub-systems will be lost and incidental features of construct symbols may lead us out of the field altogether.

(*b*) The second two characteristics particularized were tendencies for the thought to be directed by alliterations, analogies, clang associations, associations with accidents of the speaker's environment, symbolic meanings and the condensation of several (perhaps mutually contradictory) ideas into one and the use of words out of context. It can be generally argued that construct relationships are in fact what we usually refer to under the term "meaning" and tentative experimental validation has been given for this assumption. If, therefore, construct relationships are weakened, there is, *ipso facto*, a weakening in meaning. Normally, our talk is firmly *anchored* in the meaning of terms but if meaning grows weak, then other more or less meaningful aspects of terms may begin to guide our talk. Clang associations, condensations and so forth, become important and begin to affect tenor and direction of thought, precisely because the *anchoring effect* of strong meanings is lost.

(*c*) The characteristic of "clinging to unimportant detail" is particularly interesting, since it obviously implies "important in normal thinking". The importance of details is a function of the superordinacy in the hierarchy of the personal construct system of the particular constructs which normally subsume them. If a person's construct system has loosened, then subordinate/superordinate relationships between constructs may have altered in direction, or at least been proportionately minimized. Thus, in the eyes of the schizophrenic, he is obviously not "clinging to unimportant detail" but persevering with a consideration of some aspect which, within his loosened frame of reference, now occupies a relatively superordinate position.

(*d*) The next two characteristics both refer to vagueness and poverty of ideas, features which seem consistent with the idea of loosened construing. Again, if we construe loosening as "loss of meaning" then the rich and intricate pattern of significance produced from a complex and structured network of constructs will disappear under loosening and something more nearly approaching noise in the guise of verbal symbols may result.

(*e*) Finally, indications of thought blocking and indications of pressure of thoughts are judged to be characteristic of the talk of thought-disordered schizophrenics. At a lower level of abstraction this could be described as a

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tendency to produce either unusually rapid talk or talk marked by pauses more frequent and longer than is usual. To explain this abnormality we must first consider what governs the rate of production of talk in normals. If we consider talking and by inference thinking, to be a process of *serial construing*, then at the end of each "unit of construction" a person is faced with a related network of constructs, relevant because they are structurally related, which he must *scan* in order to select the next "unit of construction". It is the existence of this related network of constructs which regulates speed of talk and thinking, both insofar as the relationships ensure that further channels for construing are available, thereby facilitating continuance, and insofar as there is a network of relationships and not a single continuous line, thereby setting up optimal speeds of talk by presenting a sequence of *multiple choice* situations. Once construing is loosened, as for the thought-disordered schizophrenic, the optimal and minimal speeds of construing are widened and greater variability can be anticipated. This because the weakening at a certain level may reduce the number of related constructs and thereby reduce the number of items in each multiple choice situation, thus facilitating more rapid talk. At more severe levels of weakening by loosening, constructs may be produced which relate to virtually *no others*, thereby presenting not a reduced choice of channels, but no channels whatsoever, with consequent blocking.

This type of explanation designed to account for the specific characteristics of talk in thought-disordered schizophrenics has, perhaps, little heuristic value without operational definitions and experimental realization but it seems necessary to indicate that there are no obvious contradictions between the phenomena of thought-disordered talk as it presents itself and the explanation in construct terms given for the schizoid condition as a whole.

Conclusions

In the experiments described the explanatory concepts and the techniques were deliberately stretched to their limit for "pilot" purposes and until the work is replicated and extended, conclusions can only be of a most tentative kind. However, three possibilities seem worthy of further examination:

(*i*) That personal construct theory may prove a useful orientation for experimental work in psychology.

(*ii*) That repertory grid techniques may provide a useful mode of investigating aspects of conceptual relationships.

(*iii*) That weakening of construct relationships as defined in the work reported, may be a useful explanatory starting point for an attack on the clinically observed phenomenon of schizophrenic thought-disorder.

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