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The Genesis of Schizophrenic Thought Disorder: Re-test of the Serial Invalidation Hypothesis

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Introduction

The study to be reported was carried out within the framework of Personal Construct theory as proposed by Kelly (1955) and summarized in Bannister (1962).

In two previous studies (Bannister, 1960, 1962a) it was found that thought-disordered schizophrenics had very weak conceptual structure (loosened construing) in terms of repertory grid performance. Repertory grid technique quantifies and statistically analyses the relationships *between* sorting categories for subjects performing sorting tests.

This condition (low inter-correlations between constructs) is presented as a theoretical and operational definition of the clinical state of thought disorder and is thought to be the ultimate consequence of serial invalidation experiences. Every construct is essentially a prediction because of its linkages with other constructs. Thus if we construe a person as say RELIABLE and our constructs of RELIABLE and TRUTHFUL are linked (in general terms "logically related" and in test terms "correlated") then we anticipate TRUTHFUL behaviour from RELIABLE people. (If we have a very tight construct system then we might also expect PUNCTUAL, INTELLIGENT, AFFECTIONATE and so forth behaviour from RELIABLE people.) Construct theory argues that each of us operates a complex hierarchy of related constructs (designed to interpret our situation and anticipate events) and when we *think* or *infer* we are essentially construing an object or person in terms of one bipolar construct and then checking our personal network of related constructs to see what we might reasonably expect of a person or object thus construed. The more tightly organized (highly intercorrelated) our personal construct system, the more specific and extensive our expectations become and the more likely we are to be invalidated; the looser our system then the vaguer and more multi-directional our predictions become and the less likely we are to be invalidated. It is hypothesized that the thought-disordered schizophrenic has reacted to serial invalidation experiences by progressively loosening his construct system to the point at which invalidation is no longer experienced but concomitantly to the point at which organized thinking and communication become virtually impossible.

This hypothesis was put forward and tested in Bannister (1963). It was found that subjects reacted to serial validation by progressively increasing the value of the correlations between their constructs and reacted to serial invalidation by massive changes in the *pattern* of the correlations between their constructs (changes from negative to positive correlations and *vice versa*) but loosened construing (lowering the total value of the correlations) was not produced. The experiments to be reported are variants of the original design aimed at demonstrating loosened construing and defining the conditions under which it takes place. The aim of the whole series of experiments remains the same—to produce an experimental prototype of schizophrenic thought disorder.

Experiment I

Subjects

Eighteen normal adults (without psychiatric history)—nine men and nine women.

Test Administration

Subjects were told that their ability to assess character and personality from facial appearance was being put to the test. Each subject was

faced on his first testing session with an array of ten photographs of people unknown to him. He was asked to rank order these photographs first on the adjective MEAN, i.e. from the most MEAN down to the least MEAN, then he was asked to rank them on the adjective GOOD from the most GOOD down to the least GOOD and so forth for a total of six adjectives as follows—MEAN, GOOD, SINCERE, SELFISH, INTELLIGENT and KIND.

On his second testing session he was faced with a *new* array of ten photographs and again asked to rank order them in terms of the same six adjectives. This procedure was repeated twice a day for a total of ten days with ten different photographs being presented at each trial, making a total of two hundred photographs to be ranked on six constructs over twenty trials.

The subjects had been randomly allotted to three groups of six—a validated, an invalidated and an uninformed group. These groups were differentially treated as follows: at each testing session (after the first) members of the validated group were given fake score cards showing that they had done exceptionally well in ranking the photographs on the qualities; the invalidated group were given fake score cards which showed that they had done very badly in their rankings of the photographs; the uninformed group were told at the beginning that the tests would not be scored until the twenty trials were completed and that therefore no information could be given to them as to whether they were doing well or badly. It must be stressed that all that can be said of this third (uninformed) group is that they were not *experimentally* validated or invalidated; there was no way of preventing them from making assumptions about how they were doing and reacting to these asssumptions just as they might react to explicit validation or invalidation.

Scoring

For each trial Spearman rhos between each of the subject's six adjective rankings were calculated (thus there was a total of fifteen Spearman rhos calculated for each subject on each testing session). The rhos were then squared and multiplied by 100 to give "percentage variance in common" scores which are linearly related since correlations (being not linearly related) cannot be used as scores. The total of these fifteen construct relationship scores constitute the subject's *intensity of relationship score* for any one trial.

The second score derived from the test protocols was a *reversal score*. A reversal is defined as a change in the relationship between a pair of constructs from one trial to the succeeding trial of the following order—from a significant ($\cdot 564 = 5$ per cent. level 1 tail) rho to a rho in the opposite direction or *vice versa*. Thus a high reversal score indicates that the subject is frequently changing the pattern of his correlations by swinging the constructs round so that the poles are oppositely related—for example "good" may be significantly and positively correlated with "sincere" on one trial and the two may be negatively related on the next trial.

Hypotheses

These are unchanged from previously reported studies. It is predicted that serial validation will result in a progressive increase in the strength of correlations between constructs; serial invalidation will result in radical changes of pattern (reversals) and ultimately in loosened construing (lower correlations between constructs). No specific predictions are made for the uninformed group, but it is broadly expected that since they will probably provide themselves with alternating subjective validation and invalidation their scores will lie intermediate between those of the other two groups.

Results

In terms of strength of correlations (intensity of construct relationship scores) and using a Wilcoxon matched pairs signed-ranks test between first and last trials, the validated group increased their intensity of relationship scores significantly ($p < \cdot 001$); both the invalidated and the no information group did not significantly change their intensity of relationship scores.

In terms of reversal scores (changes of correlational pattern) results were clear cut and differential for all three groups. Counting as two any reversal in which the correlation was signifi-

cant in both its original and reversed direction, it was found that the validated group had a total of 51 reversals, the uninformed group a total of 105 reversals and the invalidated group a total of 146 reversals. A Sign test run over the twenty trials showed that the invalidated group had significantly more reversals than the no information group ($p < \cdot 01$) and the uninformed group in their turn had significantly more reversals than the validated group ($p < \cdot 001$).

Discussion

In summary the results of this experiment are basically the same as the results of the two experiments previously reported (Bannister, 1963). Serial validation produced a significant increase in strength of correlational relationships between constructs and serial invalidation produced radical changes in the pattern of these relationships. The hypothesized fall in intensity of relationship scores was not forthcoming.

The experimental design of each of the three studies now reported fails to deal with one or other of two problems discussed in the previous paper. They are:

(*i*) If the experiment allots subjects into different groups in such a way that some are validated on *all available* constructs and others are invalidated on *all available* constructs, then we are forcing the invalidated group to prolong indefinitely reactions of the "change of pattern" type. This, since a radical loss of intercorrelations between constructs would face them with a totally unconstruable and meaningless area.

It can be argued that the construct system of the thought-disordered schizophrenic (or to be more accurate that sub-system which deals with construing of people) collapsed because one *group* of constructs after another was progressively loosened under the impact of invalidating experience, until the total network of constructs (reduced steeply by loss of possible combinations) ceased to function as an effective whole.

(*ii*) If the alternative design which validates some of each subject's constructs and invalidates other constructs for the same subject is adopted, then we are faced with the problem of "reverberation effects". In terms of Personal Construct theory it is not entirely possible to validate one construct while invalidating another linked construct for the same person. Validation of any one construct may produce support for another linked (correlated) construct even though this latter has been specifically "invalidated".

The final experiment to be reported represents an attempt to solve both these problems. It reverts to the design of the initial experiment in the series, in that for each subject some of his constructs will be validated and others invalidated, but it seeks to avoid reverberation effects by deliberately supplying the subject with constructs which fall into two constellations which are relatively independent of each other and which can thus be subjected to differential treatment with minimal reverberation effects.

Experiment II

Subjects

Ten normal adults (without psychiatric history)—five men and five women.

Test Administration

Each subject was asked to rank order the photographs on eight adjectives which were deliberately chosen because they were thought to fall into two constellations. The first constellation consisted of a group of four "moral" constructs, i.e. KIND, MEAN, SELFISH, SINCERE and the second group was thought to be a constellation of four "intellectual" constructs, i.e. CLEVER, SIMPLE, EDUCATED, STUPID. The fake score cards presented to five of the subjects after each testing session showed consistently that they were doing well on the "intellectual" constructs but very badly on the "moral" constructs, while the fake score cards similarly presented to the remaining five subjects showed the reverse. Constructs were presented from the two constellations in mixed order.

Scoring

Again Spearman rhos were calculated for all possible pairs of constructs and squared and multiplied by 100 to give variance in common

scores. These scores for each subject were grouped into three blocks, namely a validated, block (the internal correlations *between* the four constructs on which each subject was told he was doing well), an invalidated block (the internal correlations *between* the four constructs on which each subject had been told he was doing badly) and a mixed block (the correlations between "intellectual" and "moral" constructs).

Reversal scores were calculated as before, within each of the three blocks of construct relationship scores.

Hypotheses

These were as for Experiment I (present study) with no specific hypotheses being made for the mixed block of construct relationships.

Results

As a first step it was necessary to check to see if the two alleged "constellations" actually manifested themselves in test protocols as relatively independent in terms of correlations within and between them. For Trial I (before differential validational experience had been supplied) it was found that the mean rhos within the group of "moral" constructs for all subjects was (averaging by transformation to Z and regardless of sign) ·72, the mean internal correlation within the "intellectual" group of constructs was ·71 and the mean of correlations between "moral" and "intellectual" constructs was ·46. Thus the level of correlation within the "moral" and the "intellectual" constellations respectively did not significantly differ, while their mean level of correlation differed from that of cross linkage correlations significantly ($p<\cdot001$). Thus within the conceptual frameworks of our subjects, these two groups of constructs existed as more or less separate constellations.

A Wilcoxon test between first and last trials for the validated block of constructs indicated that they had increased in correlational strength significantly ($p<\cdot001$). A similar test between first and last trials for the invalidated constructs revealed that they had fallen in correlational strength significantly ($p<\cdot01$). A similar test between first and last trials for the mixed constructs indicated no significant change in level of correlational strength. Thus a significant weakening of construct relationships such as is thought to be the paradigm of schizophrenic thought disorder was demonstrated in this experiment.

A count of the number of reversals for each of the three blocks of constructs indicated that while the mixed and invalidated group did not differ in number of reversals, both these blocks had significantly *more* reversals than the validated block (Sign test over twenty trials $p<\cdot001$).

For space reasons graph plots are omitted, but the strength of validation and invalidation effects can be visualized if it is noted that a line plotted through the mean of the first ten and the last ten trials for correlations between validated constructs would have an *upward* slope of approximately 13 degrees and a similar line fitted to the correlations between invalidated constructs would have a *downward* slope of approximately 7 degrees.

One other finding is worth reporting since it denotes a deficiency in the experimental design which may have been masking the serial invalidation effect. Rank order correlations were run between the first trial intensity of relationship scores (low to high) for subjects and their susceptibility to validation effect (tendency to increase *validated* scores—large to small effect) and this was found to be $+\cdot67$. A similar rho between intensity and susceptibility to invalidation effect (tendency to decrease *invalidated* scores) was $-\cdot70$ (both rhos are significant at the 5 per cent. level two tail). It seems likely that high intensity subjects showed little validation effects since their initial scores were too near the "ceiling" and low intensity subjects similarly failed to lose correlational strength because they were initially too near the "floor". This suggests that both effects would have been more marked had the subjects been given a larger sample of constructs to work with, thus increasing the possible variance of test scores and allowing a greater margin for change in both high and low intensity subjects.

Discussion

The term serial invalidation as used in these studies is intended to subsume the kind of

psychological process leading to breakdown of conceptual structure which in a more clinical context has been variously described as "double-bind" (Bateson *et al.*, 1956), the disintegrating effects of "mystification" by forms of family praxis and process (Laing and Esterson, 1964) and the parental "inculcation of confused and distorted meanings" (Lidz, 1964). It can be argued that such terms, while giving insight into the kind of interpersonal interaction which might generate schizophrenic thinking, are somewhat *ad hoc* and present difficulties because they do not derive from any explicit overall theory of normal human psychological functioning. The aim of the research programme, of which these studies are a part, is to subsume these various process hypotheses under one theoretically and experimentally definable concept.

Conclusions

1. In the four experiments now reported in which the incoming validational experience of subjects has been varied, it has been shown that serial validation leads to a significant rise in the level of inter-correlation between constructs.

2. It has been shown that under conditions of serial invalidation or "no information" and where cross linkage correlations between constellations of validated and invalidated constructs are concerned, there is a significant increase in number of reversals, i.e. marked changes in the *pattern* of construct interrelationships.

3. In the final study it was shown that if within a single individual, one constellation of constructs is serially validated and a second constellation is serially invalidated, then not only will the first gain in strength of interrelationship but the serially invalidated constellation will significantly decline in level of correlational relationships between constructs.

This third finding, which is the one most relevant to our central hypothesis, is a weak finding in two senses.

Although correlations between constructs are significantly reduced they have not (in absolute terms) been brought right down to the level which has been found to obtain in thought-disordered schizophrenics.

At present the finding exists as a laboratory "equivalent" of thought disorder as operationally defined—it is an experimental paradigm of schizophrenic thought disorder rather than a demonstration of the conditions as such. It has been shown that psychiatrically identified thought-disordered schizophrenics manifest loosened construing under test; a hypothetical casual process for the condition has been experimentally explored; the link between the condition in its clinically dramatic form and the laboratory manipulation is missing.

Extensions

It is intended, as a next step, to examine the logical converse of the previous hypothesis and argue that given serial *validation* then the condition of thought disorder might be modified. It is intended in future studies to "map" as extensively as possible the existing construct relation pattern for individual thought-disordered schizophrenics (utilizing a form of principal component analysis for repertory grids—Slater, 1964) in order to identify areas of residual structure which are left to them. The environment of the schizophrenics will then be engineered so as to validate serially such areas of residual structure within their conceptual framework, and they will be systematically re-tested to see if there is any rise in the general level of correlations between their constructs. In such an experimental context it would be possible to examine whether the clinical features of thought disorder are modified.

Summary

Following previous studies which identified loosened construing (weakness of correlation between constructs in repertory grid measures) as a central aspect of schizophrenic thought disorder, the experiments reported are further attempts to produce a model of this condition in normals. It was finally shown that if two separate constellations of constructs are available to normal subjects and one is serially validated and the second serially invalidated, then intercorrelations in the former will rise

while in the latter the pattern of construct relationship will repeatedly change and the strength of correlations will ultimately fall. An extension of the research programme seeking to modify thought disorder in schizophrenics is indicated.

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