
THE USE OF AN OBJECT SORTING TEST IN ELUCIDATING THE HEREDITARY FACTOR IN SCHIZOPHRENIA

BY

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Much evidence is now available as to the importance of the hereditary factor in the causation of schizophrenic psychoses. However, the mode of inheritance still remains doubtful, Luxemburger and Kallmann favouring a recessive, and Lenz a dominant type. Kallmann has consistently advanced the theory that a specific recessive gene transmits the disorder, but that its effects can be successfully resisted by a "non-specific and certainly multifactorial type of secondary genetic mechanism" (Kallmann, 1952). He further considers that "the factor for schizophrenia, even though recessive, may sometimes be expressed in a purely heterozygous condition, but only to the extent of schizoid personality changes . . . Schizoid types may be either heterozygote with little resistance to an intermediate expressivity of their single gene, or strongly resistant homozygotes" (Kallmann, 1946).

If this theory is correct, both the parents of schizophrenics must be either heterozygous or homozygous with respect to this gene, and so may show these schizoid personality changes. It was therefore considered that it would be of interest to investigate the possibility that the parents of schizophrenics show schizoid features more commonly than a control population.

The Schizoid Personality

Kallmann himself leaves the concept of the "schizoid personality" undefined. Noyes (1953) describes it as "marked by incongruities of the feeling-life coupled, characteristically, with a poorly socialized personality . . . Its contrasting affective poles are sensitiveness on the one hand and dullness or coldness on the other . . . Often it is not clearly differentiated from the cyclothymic, between which and the schizoid there is a sliding scale."

Mayer-Gross, Slater, and Roth (1954) agree that this personality "has as its main characteristic the quality of shyness, extreme sensitivity, sometimes apparent emotional coldness . . ."; but note in addition "tendencies towards a paranoid or fanatic attitude, towards the bizarre, eccentric or socially inappropriate modes of behaviour."

Henderson and Gillespie (1956) identify the schizoid with the "shut-in" personality and quote Farrar as distinguishing five main types: "(1) The backward type, lacking ambition, absent-minded; (2) the precocious type, bookish, serious; (3) the neurotic variety, selfish, and deceitful . . . with minor ailments; (4) the asocial, exclusive and daydreaming; and (5) the juvenile, which never seems to grow up."

Though there is a considerable amount of agreement between the above definitions, utilizing them to decide whether a "schizoid personality" was present or absent in any particular person would be somewhat subjective. A more objective method of assessment was therefore sought for. For this reason a finding of Rapaport (1945) was followed up. He was investigating the performance of a clinical and a control group on a sorting test, and noted that by restricting his scoring to certain features he most clearly separated the schizophrenic from other clinical groups. But then a high percentage of persons in the control group with a "schizoid personality" also scored within this range of abnormality. Though he does not define what he means by "schizoid personality", he indicates that it includes persons with a "limited range of interests, a tendency toward some degree of withdrawal, an unusual lack of colourfulness . . ." This appears to share sufficient features with the above definitions to be accepted as the same concept.

It was therefore considered that a sorting test might provide a means for objectively estimating the presence of schizoid features in the personality.

Sorting Tests

The sorting test was first introduced by Vigotsky to study thought disorder in schizophrenia. Its rationale is described by Rapaport (1945):

"Sorting behaviour, in response to the instruction to 'put together those objects which belong together' is an expression of concept formation. Sorting behaviour, wherein the subject compares objects that belong to the realm and objects that do not belong to the realm, gives the examiner an opportunity to assess how rigid and concrete (narrow), or how fluid, vague, and over-generalized (loose), the concept formation of the subject is.

..."
However, the sorting tests have not been found of sufficient value by psychiatrists to have attracted widespread interest. This may be for two reasons. One is that the workers who utilized these tests in the study of thought disorder tended to ignore the clinical findings in this field, and employed rather the conclusions of Goldstein (1944) and Kasanin (1944) that in schizophrenia there is usually a reduction in abstract thinking and a tendency to think in more concrete terms. Yet when we examine the original work of Bleuler (1951), we find him advancing a different concept:

"In schizophrenia the associations lose their connections. This disorder may interrupt a few, many, or most of the thousands of threads which direct our thoughts. As a result thought becomes unusual and often logically false. ... Naturally no fruitful train of thought can come of associations based merely on habit, similarity, subordination, causality, and so forth; it is the goal-presentation that shapes a series of concepts into thought. ... For example, the concept of water varies greatly with its context, as in chemistry, physiology, shipping, landscape, flood, power supply and so on. Every one of these special concepts is tied to our ideas by a different thread: no healthy person thinks of soda-water when a flood is sweeping his house away, nor of buoyancy when he wants to quench his thirst. ... In normal persons only those ideas come to the foreground which fit the context."

Again we find Noyes (1953) describing this thought disorder thus:

"Because of their origin in the unconscious, associations are broken, are led into bypaths, are fragmented, incongruous, do not progress, or are joined together through common affects rather than through conscious, logical connections. ..."

Hence it seems that the feature stressed by clinicians as found in this thought disorder is the presence of illogical, inappropriate, or irrelevant associations.

When a method of scoring sorting test performance was employed which gave weight only to the degree of irrelevance of the responses, a significant correlation was obtained between this score and a clinical estimation of thought disorder in schizophrenics, based on this concept (Lovibond, 1954). Henceforth when the term "thought disorder" is used in this article, it will be in this sense, i.e., thinking which contains illogical, inappropriate, or irrelevant associations.

The other reason which may have contributed to the relative lack of value of this type of test may be precisely the one which makes it more useful in the present investigation, namely, that it indicates the presence of "schizoid" personality features rather than schizophrenia per se, as Rapaport's finding quoted earlier suggests.

The Present Investigation

The hypothesis is tested that the performance of the parents of schizophrenics on the object sorting test will differ significantly from that of control normals, in the direction of the performance of schizophrenics.

Description of the Test.—The sorting test employed was that described by Rapaport (1945). The test material consists of 33 common objects: a real and an imitation (miniature, plastic) knife, fork, and spoon, a pipe, a cigar, a cigarette, a red ball, a lock, etc.

The test itself has two parts. In the first part the subject is required to place with each of seven initial objects "all of those objects which belong with it".

After he has completed his sorting he is asked, "Why do all these belong together?"

In the second part the examiner consecutively places before the subject 12 different groups of objects, each group having a different essential characteristic in common, i.e., they are all tools, toys, eating utensils, etc. The subject is asked each time, "Why do all these belong together?"

The subject's grouping in the first part and his verbal responses in both parts are recorded.

Administration.—To retain comparability with the results of Lovibond, the test was administered in accordance with the instructions of Rapaport, with the additions introduced by Lovibond (1954).

Method of Scoring.—The method referred to above was employed in which only the degree of irrelevance of the response is scored. In brief, if the subject's reason as to why the group of objects belonged together was applicable to, or could be extended to, approximately half of the remaining test objects, it was regarded as at the first level of irrelevance and scored one point. For example, if he said that all the paper objects belonged together because they are all inflammable, the property of inflammability is shared by about half of the remaining test objects. If his reason was applicable to, or could be extended to, all the remaining test objects, it scored two points. For example, the response "because they are all found in a house" applied to any grouping, could equally well apply to all the test objects. If his reason was applicable to, or could be extended to, all, or practically all, of the inanimate objects of the universe, it scored three points, for example, the response "because they all originally came out of the ground". It should be noted that failure to see a relationship, or the use of concrete reasoning, is not scored, and so does not penalize the subject.

In the investigation referred to above, a score of more than 6 correlated significantly with the presence of "thought disorder" in schizophrenics determined clinically; a score of 6 or less, with its absence.

The Experimental Group.—This consisted of 20 parents of schizophrenic in-patients, both recently admitted and long-term (up to seven years as in-patients). The criteria for selection were:

1. The patient showed clinically the presence of "thought disorder", as defined above. This might ensure a more homogeneous group of schizophrenics and more certain diagnosis.
2. Both parents were able and willing to undergo testing, e.g., they were able to speak English fluently.
TEST FOR ELUCIDATING SCHIZOID FEATURES

Also they were "normal" in the sense that they were not hospital patients, were carrying on an occupation in the community, and were not apparently suffering from any form of psychiatric illness.

The Control Group.—The control group employed by Lovibond (1954) consisted of 45 subjects, "normal" in the sense defined above.

Results
A summary of the major characteristics of the experimental and this control group, control², is shown in Table I.

| TABLE I
MAJOR CHARACTERISTICS OF EXPERIMENTAL AND CONTROL GROUPS |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Group</td>
<td>No. of Each Sex</td>
<td>Age in Years</td>
<td>Education in Years</td>
</tr>
<tr>
<td></td>
<td>M.</td>
<td>F.</td>
<td>M.</td>
</tr>
<tr>
<td>Experimental</td>
<td>10</td>
<td>10</td>
<td>Mean 47</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Range 39/63</td>
</tr>
<tr>
<td>Control²</td>
<td>30</td>
<td>15</td>
<td>Mean 26/1</td>
</tr>
<tr>
<td>n = 45</td>
<td></td>
<td></td>
<td>Range 16/50</td>
</tr>
<tr>
<td>Control²</td>
<td>10</td>
<td>10</td>
<td>Mean 51/8</td>
</tr>
<tr>
<td>n = 20</td>
<td></td>
<td></td>
<td>Range 39/71</td>
</tr>
</tbody>
</table>

It will be noted that there is a considerable discrepancy between the mean age of the experimental and control² groups. However, the experimental group are not of an age when senile changes would have taken place to any significant extent, and I have not noted any differences in patterns of "thought disorder" between these age groups. Also Cameron (1944) concluded from his investigation that changes in thinking with age were distinct from the patterns found in "schizophrenic thought disorder".

To validate further the comparison of the performances of these two groups an additional control group was investigated, control³. A summary of the major characteristics of this group is also shown in Table I. It consists of 20 medical patients at or above the age of 39, chosen at random by the charge nurses of a male and a female ward in a London general hospital.

A comparison of the performance of these two control groups on the sorting test is shown in Table II.

| TABLE II
RELATIONSHIP OF SCORES OF PERFORMANCE ON SORTING TEST OF TWO CONTROL GROUPS |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>Control³</td>
<td>Control³</td>
<td>Total</td>
</tr>
<tr>
<td>Scores of 6 or less</td>
<td>41</td>
<td>18</td>
<td>59</td>
</tr>
<tr>
<td>Scores of more than 6</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>20</td>
<td>65</td>
</tr>
</tbody>
</table>

As there is no significant difference between the performance of these two groups, their summated scores were employed in the comparison with the experimental group, as shown in Table IV.

The scores of the individual members of the experimental group are given in Table III.

| TABLE III
SCORES OF PARENTS OF SCHIZOPHRENICS WITH "THOUGHT DISORDER" ON SORTING TEST |
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>Mother</td>
<td>Father</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>0</td>
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<td>4</td>
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<td>2</td>
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<td>5</td>
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<td>6</td>
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<tr>
<td>7</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>13</td>
</tr>
</tbody>
</table>

It will be noted that in each of the 10 cases at least one parent had a score above 6, that is, a score which in schizophrenic patients correlated significantly with the presence of clinical "thought disorder". The significance of this finding was investigated by testing its relationship with the distribution of scores in the normal control group, as shown in Table III.

| TABLE IV
RELATIONSHIP OF SCORES OF PERFORMANCE ON SORTING TEST IN PARENTS COMPARED WITH CONTROLS |
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Scores of 6 or less</td>
<td>Parent</td>
<td>Controls</td>
<td>Total</td>
</tr>
<tr>
<td>8</td>
<td>59</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>6</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>65</td>
<td>85</td>
<td></td>
</tr>
</tbody>
</table>

The x² test with Yates' correction for small numbers shows the probability of the above groups having come from the same population is less than 0.1%. We can therefore conclude that the scores of parents of schizophrenics with "thought disorder" on the sorting test differ from those of control normals in the same direction as do those of the schizophrenic patients themselves.

Discussion
As this tendency to score highly on Rapaport's sorting test is found in a high percentage of the parents of schizophrenics as well as in schizophrenics themselves, it seems that this score may provide an objective measure of certain aspects of the "schizoid personality". If this is so, the finding of a score indicative of "schizoid" features in at least one of the two parents of every patient investigated would support Kallmann's concept quoted in the introduction, viz., that the presence of the gene producing schizophrenia may be indicated in those people who successfully resist the disease by the production of a "schizoid personality". The
finding that the significant score was present in one parent in all cases, but in both only twice, might suggest a dominant rather than a recessive mode of inheritance. To take this as more than suggestive would be extremely rash, but it is worth following up. If confirmed, the discrepancy with Kallmann's conclusion might be explained by the more homogeneous nature of the schizophrenic patients investigated, only those with clinical "thought disorder" being selected. Mayer-Gross et al. (1954) found modes of fairly certain.

highly. score seems of mality performance on solely acceptable an an of the statement disease.

It might be selected. one be that the nature geneous. If confirmed, be of inheritance. suggest that the finding of irrelevance of extremely rash, interest concept a a view of the factors measuring on actual. that the degree of relevance of the responses, it seems likely that we are dealing with an abnormality of concept formation in those people who score highly. That such an abnormality could contribute to the "bizarre, eccentric, or socially inappropriate modes of behaviour" (Mayer-Gross et al., 1954) found in the "schizoid personality" is fairly certain.

Summary
A significant number of parents of schizophrenics with "thought disorder" were found to obtain scores on the sorting test of Rapaport (1945) different from those of control normals but similar to those found in schizophrenic patients.

It is suggested that this test may provide an objective means of estimating the presence of "schizoid" features in the relatives of schizophrenics, and thus aid in the elucidation of the hereditary factors in schizophrenia.

REFERENCES
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