

Size Constancy and Abstract Thinking in Schizophrenic Patients

Factor Analytic Study

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In a previous paper¹ the authors reported upon an experiment conducted to test the hypothesis that in schizophrenics there was a positive correlation between size constancy and ability to form concepts or abstract thinking.

This brief paper is intended as an extension of the initial study and constitutes a report upon a factor analysis of the data reported earlier. It is hoped that this analysis will offer further clarification of the initial hypotheses. These two hypotheses were formulated as follows:

1. Constancy of perception depends on selecting certain cues and rejecting other cues. Therefore, it could be related to the ability to break down *gestalts*, if, by *gestalts*, are understood primary and total configurations of visual cues, which are perceived *literally*, as a pattern of light and not as denoting certain objects. In thought

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processes such selectivity will manifest itself in the ability to form stable *classes* of *things* or *objects*, which is the essence of concept formation.

The hypothesis arising from these considerations might be stated: *Measures of constancy of perception; measures of the ability to break down gestalts and measures of the level of abstraction in thinking should show high loadings in the same direction upon one of the extracted factors.*

2. Both perception and thinking are determined by social learning and by habits of perceiving and thinking existing in a given social context. Constancy of perception is related to the ability to *recognize* culturally familiar objects. In schizophrenic patients both perceptual and thought disorders are due to an estrangement from society.

This hypothesis might, therefore, be stated: *Measures of constancy of perception and measures of autism should show high loadings in the same direction upon one of the extracted factors.*

Sample

The sample included 40 chronic schizophrenics upon whose diagnosis all psychiatrists who had examined them were in



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agreement. There were 30 males and 10 females. Fifteen were diagnosed as paranoid, 12 as hebephrenic, 4 as catatonic, 3 as simple and 6 as undifferentiated schizophrenics. The mean age was 38 years (S.D. = 8.7 years). The average length of hospitalization was 7 years, 8 months (S.D. = 6.2 years). No patient in whose case there was a possibility of mental deficiency or organic brain disorder was included. No patients undergoing insulin or electric shock therapy were included. Only patients who would co-operate in the experiment were included in the sample. All subjects had visual acuity of 20/20 corrected or uncorrected.

Method

Tests were administered to assess the capacity to form concepts, to determine the abstractness of level of thinking, to test ability to break down gestalts, to test the ability to attend selectively, to assess the degree of size constancy in perception and to assess the level of intelligence. The battery included the following tests:

1. Similarities sub-test from the Wechsler-Bellevue tests.
2. Benjamin's Proverbs test.
3. Goldstien-Scheerer Object Sorting test (Active and Passive forms).
4. Goldstien-Scheerer Color-form Sorting test.
5. Letter Finding test.

6. Gottschaldt's Figures.
7. Stroop test.
8. Size constancy measured by a matching process previously described.²
9. Vocabulary sub-test from the Wechsler-Bellevue Scale.
10. Comprehension sub-test from the Wechsler-Bellevue Scale.

The method of scoring the sorting and proverb tests has been outlined previously.¹ Briefly, however, they were scored on 4-point scales to yield measures of abstractness and autism. The scores from the tests of abstractness were combined to form the *combined abstraction level score*. Scores of autism from individual tests were similarly combined to provide a *combined autism score*. In the case of the autism measure, low scores indicated a pronounced degree of autism whereas high scores indicated its absence.

These tests were also scored in accordance with McGaughan and Moran's³ suggestions for autism and for openness of concept.

In our previous report we indicated that two methods were employed in measuring intelligence. In one case an attempt was made to correct for the interference of autistic thinking upon intelligence test results. In the other case no such attempt was made and the scores were determined in accordance with Wechsler's standardized procedure. The two sets of scores proved to be highly correlated .85, and in this analysis we have used the latter data since they are easily replicated and lack the subjective judgemental considerations introduced by our attempt at correction. The intelligence measure is therefore the average of scores on Wechsler's Information and Vocabulary sub-tests.

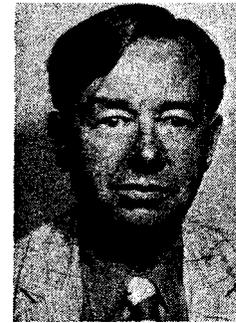
The measures of size constancy and measures of intra-individual variability in size

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estimates were made for two distances (7.5 meters and 15 meters). When data obtained from testing at 7.5 meters were checked against data obtained from testing at 15 meters, the intercorrelation of both size constancy measures and of variability measures was found to be .64. In the present analysis we have utilized the data derived from testing at 15 meters.

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Results

The correlations between the variables are presented in Table I:

TABLE I
CORRELATION MATRIX

<i>Tests</i>	1	2	3	4	5	6	7	8	9	10	11	
Size Constancy	1		-.41	.07	.46	.20	.31	.22	.20	.19	-.06	.02
Variability of Size Constancy	2	-.41		-.22	-.17	-.25	-.16	-.15	-.05	-.16	.21	-.75
Intelligence	3	.07	-.22		.15	.64	.11	.65	.27	.03	-.27	.88
Combined Abstraction score	4	.46	-.17	.51		.42	.52	.45	.52	.33	-.20	.49
Combined Autism score	5	.20	-.25	.64	.42		.00	.89	.24	-.02	-.08	.80
McG's Openness	6	.31	-.16	.11	.52	.00		-.03	.51	.15	-.27	.01
McG's Autism	7	.22	-.15	.65	.45	.89	-.03		.09	.03	-.03	.81
Letter Finding	8	.20	-.05	.27	.52	.24	.51	.09		.33	-.21	.26
Gottschaldt's Figures	9	.19	-.16	.03	.33	-.02	.15	.03	.33		-.09	-.01
Stroop test	10	-.06	.21	-.27	-.20	-.08	-.27	-.03	-.21	-.09		.02
Color-form Sorting	11	.02	-.75	.88	.49	.80	.01	.81	.26	-.01	.02	

An orthogonal analysis was carried out using Thurstone's Method.⁴ Five factors were extracted leaving insignificant residuals. The centroid loadings of the variables are presented in Table II.

TABLE II
CENTROID LOADINGS

<i>Tests</i>	<i>F I</i>	<i>F II</i>	<i>Factors F III</i>	<i>F IV</i>	<i>F V</i>
Size Constancy	.42	-.28	-.23	.27	.15
Variability of Size Constancy	-.54	-.09	.54	.34	-.35
Intelligence	.74	.32	.24	-.16	-.17
Combined Abstraction score	.75	-.33	.27	.17	.15
Combined Autism score	.72	.47	.20	.24	-.08
McG's Openness	.41	-.56	.12	-.19	-.07
McG's Autism	.68	.48	.25	.36	-.07
Letter Finding	.52	-.45	.29	-.13	.08
Gottschaldt's Figures	.26	-.34	-.13	.12	.22
Stroop test	-.27	.19	.06	.21	.32
Color-form Sorting	.80	.67	.18	-.39	.45

Simple structure was achieved with 5 rotations. The rotated factor loadings are presented in Table III.

TABLE III
ROTATED FACTOR LOADINGS

<i>Tests</i>	<i>F I</i>	<i>F II</i>	<i>Factors F III</i>	<i>F IV</i>	<i>F V</i>
Size Constancy	.11	.48	-.18	.36	-.02
Variability of Size Constancy	-.18	-.25	.86	.02	.01
Intelligence	.80	.48	-.12	-.27	.01
Combined Abstraction score	.46	.71	.03	-.11	.28
Combined Autism score	.92	.05	-.04	.13	.04
McG's Openness	.03	.70	.07	-.22	.03
McG's Autism	.91	.02	.04	.22	.07
Letter Finding	.15	.67	-.02	-.23	.31
Gottschaldt's Figures	-.05	.41	-.15	.22	.10
Stroop test	-.09	-.31	.02	.27	.30
Color-form Sorting	.89	-.06	-.65	.27	.50

Discussion

The first factor seems to be highly related to the effective use of intellectual capacities. High loadings were found with regard to measures of lack of autistic thinking; scores from Goldstien's Color-form Sorting test and with intelligence test scores. Measures of the *level* of abstraction in thinking show a moderate relationship to the underlying variable—other measures show negligible loadings. This factor may be related to the severity of illness and to the cooperation during testing.

Highest loadings on the second factor are observed in the case of measures related to abstractness of thinking; measures related to the breakdown of gestalts and measures of constancy of perception. This pattern of loadings corresponds to that predicted by Hypothesis 1 and must be regarded as confirmatory or supportive evidence.

Factor 3 shows only two measures loading highly. Variability of estimates in size constancy testing shows high positive loadings whereas the Goldstien Color-form Sorting test shows a high negative loading.

This factor would appear to be related to the

inability to maintain a particular set. Factors 2 and 3 seem to be closely related to the ability to attend selectively.

Factors 4 and 5 are not clearly defined though one might speculate that factor 4 is related to dissociation and factor 5 to flexibility of set.

It is obvious, however, that although this study appears to provide evidence in support of Hypothesis 1, the results offer no evidence in keeping with Hypothesis 2.

Summary

A group of 40 chronic schizophrenics were tested using a battery of tests measuring size constancy in perception, intelligence, the capacity to break down perceptual gestalts, the level of abstraction of thought processes and the degree of autism evidenced in response.

These measures were intercorrelated and factor analysed in an attempt to test two hypotheses:

1. *Measures of constancy of perception; measures of the ability to break down*