SIZE CONSTANCY IN SCHIZOPHRENIC PATIENTS*

By

T. E. WECKOWICZ, M.B., Ch.B., D.P.M.

Research Psychiatrist
Saskatchewan Hospital, Weyburn, Saskatchewan

INTRODUCTION

(*A*) *Size Constancy*

CONSTANCY of perception is one of the basic mechanisms of adjustment to the environment. It allows the subject to perceive stable objects in the external world instead of ever-changing flux of stimulation. It maintains the perceived environment within wide limits constant, thus it is a homeostatic mechanism of great importance for the biologic adaptation of the organism. Constancy of perception includes constancy of size. When the distance between an observer and an object changes Size Constancy allows him to perceive the object as being within wide limits, the same size in spite of the fact that the size of its retinal image varies in direct proportion to the distance according to the equation $a=\frac{A}{D}$. (In this equation "a"—is the size of the retinal image, "A"—is the size of the object and "D"—is the distance of the object from the observer.)

Extensive studies of size constancy in normal people have been carried out by Brunswik (2, 3), Holway (9) and Gibson (6). They have demonstrated that the "apparent" or phenomenal size of a perceived object is represented neither by the retinal stimulus nor by the real object, but is generally intermediate between the two, being much nearer the size of the real object. The cue provided by the retinal image size is integrated with the cues provided by the whole visual field, such as spatial relationships with other objects (2), natural gradients of texture (6), and the cues provided by the "set" of the perceiving organism, such as changes in ocular convergence, binocular parallax and head movement parallax. As a result a "Gestalt" or invariance is obtained, which remains constant although the constituents may change. (A retinal image of a certain size is interpreted either as produced by a small object at a short distance or a large object at a long distance, depending on the significance attached to the various other cues.)

According to Hilgard (7) and Gellhorn (5), in this process past experience and learning play an important role, although the inborn mechanism seems to be equally important. Brunswik (3) and Holaday (8) have found that in perception, the organism's orientation or "intention" is toward the "real" object, and it is only when other cues are greatly reduced, or when the subject assumes a highly sophisticated experimental attitude that a phenomenal percept can approach the stimulus value—the size of the retinal image. In the experiments with the constancy of perception, we are dealing not with the "apparent" or "phenomenal" size, but with the "judged size", by which is meant the physical size of a comparison object judged to be equal to the standard. It is usually assumed that the "judged size" is directly influenced by the "phenomenal size". This assumption is correct only up to a point, as we are capable of judging

* Saskatchewan Committee on Schizophrenia Research.

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

correctly the size of familiar objects at a great distance in spite of the fact that these objects look small. This differentiation has to be borne in mind in all the interpretations of the results of the experiments with the size constancy. However, in case of unfamiliar objects, this differentiation is less important.

(B) Size Constancy in Schizophrenia

Schizophrenia is a severe mental illness which leads to a profound disorganization of behaviour, thought process and perception (illusions and hallucinations). The latter occur in spite of the fact that the function of the sensory organs is normal, and it has to be attributed to the disorder of some higher central processes. In psychodynamic terms, schizophrenia has been described as a "regression to primary narcissism", a withdrawal from object relationships, and an increasing concern for the self (Fenichel, 4). Whatever the interpretation, whether physiological or psychological, it is possible that in schizophrenia, constancy of perception breaks down and that this leads to the perplexity, feeling of change, and strangeness of the world which they experience, particularly in the early phases of their illness (Bruner, 1).

G. A. Reynolds (13), in an unpublished Ph.D. Thesis, investigated size constancy for familiar objects (playing cards) and unfamiliar objects (plain cards) in three groups of schizophrenics (paranoid, catatonic and hebephrenic), and one group of normals. The schizophrenics were in a state of remission, and were not suffering from active symptoms. The subjects were asked to make verbal assessments in inches of the sizes of the cards and their distances.

He found that the distance and the size taken separately did not differentiate between the normals and schizophrenics, but the apparent visual angle (the distance and the size combined) differentiated between these two groups. In schizophrenics, the constancy of perception was better (apparent visual angle changed less). He further found that in the normals, constancy of perception was better for the familiar objects (playing cards) than for the unfamiliar objects (plain cards), the reverse held for schizophrenics.

He interpreted the results as due to the fact that the schizophrenics were less anxious than the normals during the experiment, and that they operated on the basis of some consistent "personality attitude", which was absent in the normals. This attitude was "the negative cultural attitude", which produced a greater constancy in schizophrenics for unfamiliar objects (plain cards) than for familiar objects (playing cards).

H. L. Raush (11) suggested that schizophrenics, as far as the constancy of perception was concerned, are not a homogeneous group. He assumed the existence of a polarity, typified at one end by paranoid schizophrenics with well preserved, rather rigid personalities, systematized delusions, and little thought disorder, and at the other end by hebephrenic schizophrenics with disorganized personalities, profound disorder of thought, and fleeting, bizarre delusions and hallucinations. The schizophrenics belonging to the first group (approaching the first pole) would be characterized by a higher degree of constancy of perception than normals. The schizophrenics belonging to the second group (approaching the second pole) would show breakdown of constancy of perception.

To test this hypothesis, he compared the size constancy in a group of normals, a group of paranoid schizophrenics, and a group of other schizophrenics than paranoid, who were not, however, deteriorated. Each subject had to adjust the size of the luminous circle 4 feet in front of him to the size of

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

the standard luminous circle 20 feet away. Two sets of experiments were performed, the first set in the darkened room, where there was a poverty of distance cues, and the second set in the well-lit room, where there was an abundance of distance cues. He demonstrated that paranoid schizophrenics differed significantly from both normals and non-paranoid schizophrenics in the direction of increased size constancy (over-constancy) under two different experimental conditions. The difference was greater when the room was darkened, while there was no significant difference between the normals and the non-paranoid schizophrenics under the two conditions. He interprets the increased size constancy (over-constancy) in paranoid schizophrenics as due to the existence of a compensatory mechanism which imposes a rigid order on an environment which has become ambiguous and threatening. This was clearly shown by the fact that over-constancy was higher when the room was darkened and there were fewer cues.

In a second paper, H. L. Raush (12) has demonstrated that symbolic value of an object (such as positive affective value of an ice cream scoop, as compared with what he considered a neutral affective value of an ordinary overcoat button) has a greater influence on size judgments made by schizophrenic patients than on those made by controls in the direction of over-estimation of the size of an affectively valued object. Further, he has demonstrated that the paranoid schizophrenics show greater constriction in their judgment as to the range of a concept than do controls and non-paranoid schizophrenics. Thus, paranoid schizophrenics showed higher constancy, but also a higher rigidity and less flexibility than both normals and non-paranoid schizophrenics.

Hypothesis

This paper reports an experiment which was set to test the following hypothesis:

> Chronic schizophrenics with some personality deterioration and thought process disorder show diminished size constancy of perception when compared with normal controls and non-schizophrenic mental patients.

The Samples

Three groups were used—32 schizophrenics, 32 normals and 32 non-schizophrenic mental patients.

The Schizophrenic Sample included only patients in whom the diagnosis of schizophrenia had been firmly established by all the psychiatrists who had examined them. It consisted of 11 females and 21 males. Nine patients were originally diagnosed as paranoid schizophrenics, 14 as hebephrenic schizophrenics, 4 as simple schizophrenics, and 5 as catatonic schizophrenics. However, the clinical picture at the time of the experiment in almost all the patients was that of hebephrenic schizophrenia, or a mixture of hebephrenic schizophrenia and simple schizophrenia features.

The mean age of the patients was 36 years (S.D.=6·7 years). The average length of stay in the hospital was 7 years, 9 months (S.D.=5·8 years). No patient in whose case there was a possibility of mental deficiency or organic brain disease was included. No patient undergoing insulin or electrical shock treatment was included. Only the patients in whom a satisfactory co-operation during the experiment could be obtained were included in the sample. Thirty patients had visual acuity of 20/20 corrected or uncorrected. Two patients had 30/20 vision.

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

The normal sample included 32 volunteers from the hospital staff, 10 females and 22 males.

Their mean age was 27 years (S.D.=7·1 years).

The normal subjects were told to bring their glasses if they were using them; otherwise, visual acuity was assumed to be about 20/20.

The non-schizophrenic patient sample consisted of 18 females and 14 males. Their mean age was 43 years (S.D.=10·9 years). The average length of stay in the hospital 8 months (S.D.=21·4 months). They also had their visual acuity controlled. Their diagnoses were: Mania (remission)—2; Reactive Depression—5; Depression (endogenous)—7; Anxiety State—2; Alcoholism —9; Character Neurosis—2; Drug Addiction—3; Psychopathic Personality—1; Hysteria—1. No epileptics, mental defectives, or patients with an organic brain disease were included. There is discrepancy in the mean ages of the samples; however, it can be disregarded, because H. L. Raush (11) in his study could not find any consistent evidence of relationship between age and constancy score. Moreover, the mean age of the schizophrenic group falls between the mean ages of the two control groups, so unless we assume a curvilinear relationship, the factor of age is controlled.

Apparatus

The apparatus consisted of a white-painted box, standing on a white-painted table with a white screen behind it. There was a black rod (0·5 cm. in diameter) on the top of the box, which could be adjusted to different heights (0–20 cm.) from behind the screen. Another white screen in front of the box could be removed and put back again.

There was another white table, of the same size and shape as the first table to which was attached a white box the same size and shape as the first box with a black rod which could be adjusted to different heights (0–20 cm.) by pushing a handle behind the box. On the other side of the table was fixed a chin support.

Procedure

A long corridor was used, which was lit with electric light. All external light was carefully excluded. Care was taken to maintain a standard arrangement of objects so that the cues would not change. The subject was sitting behind the second table with his chin on the chin support, and his hand on the handle for adjusting the rod on the top of the box 44 cm. in front of him. The other table was placed at a distance from the subject. Two distances were used for each subject—first 7·5 m., second 15 m. The experimenter sat behind the screen. The subject was told to adjust the black rod on the top of the white box in front of him to the same size as the other black rod, which he saw at a distance. He was instructed to use both eyes, and not to use sighting. He was asked to use his first impression. When making a new adjustment, he was not allowed to go back to zero, but had to make it from the existing position. (The standard instruction was read to the subject.)

The experimenter showed the following sizes in the standard order of: 10, 15, 5, 11, 6, 18, 2, 14, 7, 20, 4, 17, 1, 13, 3, 19, 8, 16, 9, 12 cm. from the distance of 7·5 m., and 7, 20, 2, 18, 6, 11, 5, 15, 10, 16, 9, 12, 8, 19, 3, 13, 1, 17, 4, 14 cm. from the distance of 15 m. Each time the size of the rod was being changed, the white screen was put in front of the box, thus preventing the patient from seeing the movement of the rod.

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

The adjustments of the rod made by the patient were read and recorded by an assistant. (The patient could not see the actual measurements.) Each adjustment was recorded in centimetres as an error, either plus or minus from the standard size displayed to the subject from the distance. (The accuracy was to one decimal point.) These errors were added up, and the average error was calculated, which became the score of each subject.

"Series effect" had to be taken into consideration in using a series of different sizes as stimuli. It was hoped that this tendency to regress to the mean size of the series would be counteracted by displaying alternately large and small sizes, which by introducing the contrast phenomenon would act in the opposite direction. The instruction to adjust the rod from the previous position instead of the zero position aimed at including the same amount of "up" and "down" movement in adjusting the rod in each series, as it is possible that upward movement may require more motivation than downward movement —an important consideration in dealing with schizophrenic patients.

Results

In order to confirm the hypothesis that size constancy in schizophrenics is impaired, and that their judgment of size is more determined by the size of the retinal image, than the judgment of the normals and non-schizophrenics, the results of the experiment should show:

(1) That the schizophrenics underestimate the sizes in comparison with the other groups.
(2) That they do so to a greater extent at the longer distance (15 m.), than at the shorter distance (7·5 m.).

The statistical techniques used were analysis of variance and covariance of the average error.

TABLE I

Diagnosis	Average Error		Standard Deviation		Variance	
	7·5 m.	15 m.	7·5 m.	15 m.	7·5 m.	15 m.
Schizophrenics ..	−0·69	−0·86	1·1096	1·6906	1·2312	2·8581
Normals	+0·07	+0·32	1·0453	1·3225	1·0926	1·7490
Non-schizophrenics	+0·02	−0·06	0·7900	1·0600	0·6241	1·2360

TABLE II

Analysis of Variance. Distance—7·5 m.

Source of Variation	Sum of Squares	df.	Mean Square	F.
Between groups	9·8646	2	4·9323	
Within groups	94·5441	63	1·5022	3·2833
Total	104·4087	65	—	—

$$F \text{ ratio} = \frac{4 \cdot 9323}{1 \cdot 5022} = 3 \cdot 2833 \qquad 0 \cdot 05 > p > 0 \cdot 01$$

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

TABLE III

Analysis of Variance. Distance—15 m.

Source of Variation	Sum of Squares	df.	Mean Square	F.
Between groups	21·2761	2	10·6380	3·6524
Within groups	183·4982	63	2·9126	—
Total	204·7743	65	—	—

$$\text{F ratio}=\frac{10\cdot6380}{2\cdot9126}=3\cdot6524 \qquad 0\cdot05>p>0\cdot01$$

TABLE IV

The "t" Test for the Differences Between Mean Average Error

Groups	Distance 7·5 m. Difference	Distance 7·5 m. "t"	Distance 15 m. Difference	Distance 15 m. "t"
Schizophrenics — Normals	0·76	2·7737 $p<0\cdot01$	1·18	9·6721 $p<0\cdot01$
Schizophrenics — Non-Schizophrenics	0·71	2·9027 $p<0\cdot01$	0·80	2·2841* $0\cdot05>p>0\cdot01$
Non-Schizophrenics — Normals	0·05	0·2123 non-significant	0·38	1·2500 non-significant

* The "t" test for this difference was modified in accordance with the procedure proposed by D. G. Cochran and G. M. Cox for dealing with cases where variance is not homogeneous. (D. G. Cochran and G. M. Cox, *Experimental Design*; John Wiley and Sons, New York, 1950, pp. 92–93.)

All the differences between the Schizophrenics on the one hand and the Normals and Non-Schizophrenics on the other are in the predicted direction and are statistically significant.

The next step is to find out to what extent the estimations of the sizes by the three groups are influenced by the change of distance from 7·5 m. to 15 m. There are positive correlations in the three groups between the estimation of sizes at the two distances:

TABLE V

Diagnosis	r.	p.
Schizophrenics	+0·42	$0\cdot05>p>0\cdot01$
Normals	+0·74	$p<0\cdot01$
Non-schizophrenics	+0·64	$p<0\cdot01$

The subjects who tend to overestimate at the shorter distance tend also to overestimate at the longer distance, and the subjects who tend to underestimate at the shorter distance tend also to underestimate at the longer distance. Therefore, analysis of covariance is required.

TABLE VI

Analysis of Covariance. Distances 7·5 m.–15 m.

Source of Variation	Sum of Squares of Errors of Estimate	df.	Mean Square	F.
Total	22·1064	64	—	—
Within groups	20·9273	62	0·3375	1·7467
Adjusted means	1·1791	2	0·5895	—

$$F=\frac{0\cdot5895}{0\cdot3375}=1\cdot7467 \text{ (non-significant).}$$

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

The difference between the Schizophrenics and the Normals is in the expected direction. The schizophrenics tend to underestimate the sizes to a greater degree at 15 m., than at 7·5 m. (see Table I), and the Normals tend to overestimate the sizes to a greater degree at 15 m., than at 7·5 m.

To test the significance of this difference an average difference between the 7·5 m. distance scores and the 15 m. distance scores was calculated for the Schizophrenics and Normals. Mean difference between the scores in the Normals = +0·2466, S.D. = 0·8900, S.E. = 0·598. Mean difference between the scores in the Schizophrenics = −0·3040, S.D. = 1·0893, S.E. = 0·1956. Mean difference Normals-Mean difference Schizophrenics = 0·5506, S.E.(d) = 0·2526.

$$z = \frac{0{\cdot}5506}{0{\cdot}2526} = 2{\cdot}1797 \quad (0{\cdot}05 > p > 0{\cdot}01)$$

However, in view of the negative result in analysis of the covariance, no great importance should be attached to this difference of the "average differences" between the 7·5 m. distance and 15 m. distance.

The finding, which to a certain extent could invalidate the results obtained, is the lack of sufficient homogeneity of variance (as tested by Bartlett's test) for the 15 m. distance. However, it is a well-known fact that schizophrenics show greater variability than other groups in physiological and psychological tests and the lack of homogeneity of variance in the samples may be expression of this greater variability of the schizophrenic population. Moreover, the lack of homogeneity affects only the variance of schizophrenics and non-schizophrenics for the 15 m. distance. The modified "t" test as proposed by Cox and Cochran was used in this case to test the difference between these means.

In the individual experiments, the schizophrenics displayed a greater variability than the other groups.

TABLE VII

Diagnosis	VA—The Average Variance of Each Score*	
	Distance 7·5 m.	Distance 15 m.
Schizophrenics	5·0656	3·8625
Normals	1·2039	1·7383
Non-schizophrenics	1·2043	1·6607

* It will be remembered that the score of each individual was derived from averaging 20 readings. The average variance is the mean variance of these 20 readings in each group.

F. Ratios

TABLE VIII

Groups	F—Distance 7·5 m.	F—Distance 15 m.
Schizophrenics–Normals	4·2076	2·2219
	$p < 0{\cdot}01$	$0{\cdot}05 > p > 0{\cdot}01$
Schizophrenics–Non-schizophrenics ..	4·2062	2·3258
	$p < 0{\cdot}01$	$0{\cdot}05 > p > 0{\cdot}01$
Non-schizophrenics–Normals ..	1·0003	1·0467
	non-significant	non-significant

The performance of schizophrenics is significantly more variable than that of the normals and non-schizophrenics. There is no difference between the two latter groups.

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

It is of some interest to find out how size constancy in each group is related to the magnitude of the perceived size.

The average estimations of the perceived individual sizes were calculated for each group. (See Tables IX and X).

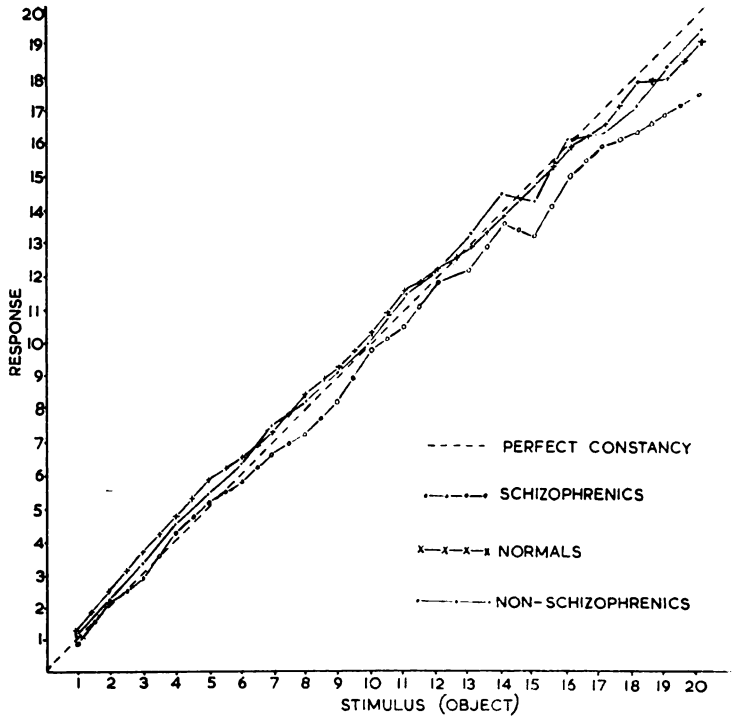


FIG. 1.—Schizophrenics, Normals and Non-Schizophrenics. Distance—7·5 metres. The three marked lines represent the average responses of the schizophrenics, normals and non-schizophrenics, plotted as a function of the size in centimetres of the standard rod. The straight, broken line represents the same function if the constancy were perfect.

In Figures 1 and 2, the straight lines at 45° are the lines which would represent the function of the estimates of the sizes, and the standard stimuli if constancy of perception were perfect. The estimations determined completely by the sizes of the retinal images would be represented by an almost horizontal line at the bottom of the graph. It can be seen that the plots of the estimates of the schizophrenics deviate in the direction of the plots of the retinal images. (The angle is less than 45°, and is smaller than the angles of the plots of the two other groups. This is more pronounced at the 15 m. distance.)*

Reliability

In order to establish the reliability of the experimental procedure and in order to find out whether size constancy is an enduring trait, the experiment

* In this paper a simple randomized design for the analysis of variance has been used. From the Tables IX and X, it appears that the size of the standard rod may be a relevant variable contributing to the variance. This problem could be solved by a treatment by levels design, but for testing the hypothesis with which this experiment is concerned, the randomized design is sufficient.

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

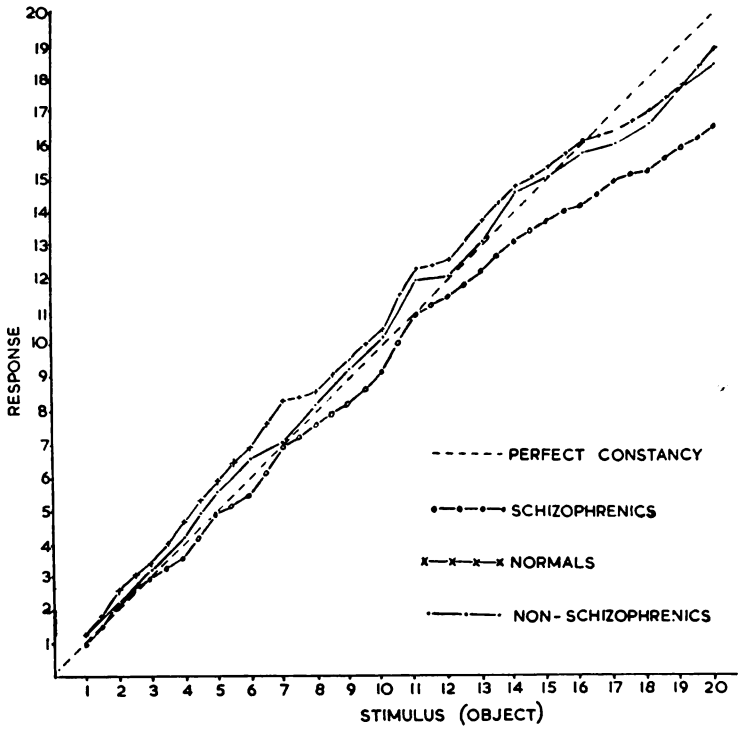


FIG. 2.—Schizophrenics, Normals and Non-Schizophrenics. Distance—15 metres. The three marked lines represent the average responses of the schizophrenics, normals and non-schizophrenics, plotted as a function of the size in centimetres of the standard rod. The straight, broken line represents the same function if the constancy were perfect.

was repeated on 20 schizophrenic patients. Those few who tended to over-estimate in the first experiment were included, some who tended to under-estimate, and a few border line cases. The Spearman rank—difference correlation (rho) between the score of each subject in the first experiment and the second experiment was calculated. (Time interval between two experiments was about one month.)

For the distance 7·5 m. rho $= +0{\cdot}64$ ($p<0{\cdot}01$)

For the distance 15 m. rho $= +0{\cdot}89$ ($p<0{\cdot}01$)

This finding agrees with the result of a preliminary experiment in which size constancy was measured by the same method on a 10 subject group of normals on two occasions. Distance 15 m. was used. The obtained rho was 0·70 ($0{\cdot}05>p>0{\cdot}01$).

It appears that the type of size constancy reaction is not an accidental finding, but is an enduring trait of an individual, and that its measurement is reliable.

DISCUSSION

This study supports the hypothesis that chronic schizophrenics, mainly of the hebephrenic type with personality deterioration and thought disorder, have as compared with normal controls and non-schizophrenic patients diminished size constancy of perception.

No claim is made that it applies to all schizophrenics. Also, the effect of prolonged hospitalization has not been excluded, as the schizophrenic and

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

TABLE IX
Distance 7·5 m.

Diagnosis	1 cm.	2 cm.	3 cm.	4 cm.	5 cm.	6 cm.	7 cm.	8 cm.	9 cm.	10 cm.	11 cm.	12 cm.	13 cm.	14 cm.	15 cm.	16 cm.	17 cm.	18 cm.	19 cm.	20 cm.
Schizophrenics ..	0·9	2·1	2·9	4·2	5·1	5·6	6·6	7·2	8·2	9·8	10·5	11·9	12·2	13·6	13·2	15·0	15·9	16·3	16·8	17·4
Normals ..	1·3	2·4	3·6	4·7	5·8	6·5	7·3	8·4	9·2	10·3	11·6	12·1	12·9	13·8	14·8	15·9	16·5	17·8	17·9	18·9
Non-schizophrenics ..	1·2	2·3	3·3	4·5	5·4	6·4	7·5	8·3	9·2	10·0	11·5	12·1	13·3	14·5	14·2	16·1	16·3	17·1	18·3	19·4
Size of the Retinal Image*	0·0013	0·0026	0·0040	0·0053	0·0066	0·0080	0·0093	0·0106	0·0120	0·0133	0·0146	0·0160	0·0173	0·0186	0·0200	0·0213	0·0226	0·0240	0·0253	0·0266

* Size of the Retinal Image: $a = \frac{A}{D}$, where A—size of the object, D—distance of the object.

TABLE X
Distance 15 m.

Diagnosis	1 cm.	2 cm.	3 cm.	4 cm.	5 cm.	6 cm.	7 cm.	8 cm.	9 cm.	10 cm.	11 cm.	12 cm.	13 cm.	14 cm.	15 cm.	16 cm.	17 cm.	18 cm.	19 cm.	20 cm.
Schizophrenics ..	0·9	2·1	3·0	3·6	4·9	5·5	7·0	7·6	8·3	9·2	11·1	11·5	12·2	13·2	13·8	14·3	15·0	15·3	16·0	16·6
Normals ..	1·2	2·6	3·4	4·6	5·9	6·9	8·3	8·6	9·5	10·4	12·3	12·5	13·7	14·7	15·3	16·1	16·5	17·0	17·8	18·9
Non-schizophrenics ..	1·2	2·2	3·2	4·2	5·6	6·6	7·1	8·2	9·3	10·2	12·0	12·1	13·0	14·6	15·0	15·8	16·0	16·7	17·9	18·5
Size of the Retinal Image	0·0007	0·0013	0·0020	0·0026	0·0033	0·0040	0·0046	0·0053	0·0060	0·0066	0·0073	0·0080	0·0086	0·0093	0·0100	0·0106	0·0113	0·0120	0·0126	0·0133

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

non-schizophrenic groups differ in the length of hospitalization. However, when the organic cases, seniles, and the epileptic cases, which may be organic, are excluded, one is left with the chronic population of mental hospitals, which is almost entirely schizophrenic. Therefore, it is extremely difficult to procure a comparable sample of chronic patients, who are not schizophrenic, and it is extremely difficult to extricate the factor of prolonged hospitalization from the factor of schizophrenia.

In order to study the potential influence of lack of control for differences in intelligence, 10 normal subjects were administered Raven's Progressive Matrices. The relation of these scores with the constancy score indicates no definite evidence of relationship, which is in agreement with Raush's (11) finding.

Schizophrenic patients show a greater variability of performance in individual experiments than the two other groups. This agrees with the general tendency of schizophrenics to show great variability of performance on psychological tests.

H. L. Raush (11) has found that early paranoid schizophrenics displayed a higher size constancy than normals. In the study reported in this paper, it has been found that chronic schizophrenic patients, who mainly belonged to the hebephrenic type, displayed lower size constancy. A possible explanation of this difference is that the breakdown of size constancy and therefore of constancy of perception is related to thought disorder of the schizophrenic patients. Most of the schizophrenic patients who were used in the experiment appeared to have a marked thought disorder when examined clinically. The relation between thought disorder and size constancy is being investigated at the present moment. Methods are being developed for assessing thought disorder more objectively than the clinical impression.

When one enquires into the implications for the schizophrenic process of the breakdown in constancy of perception and its greater variability, one is tempted to make certain generalizations. Hoskins and his group (10) found that in schizophrenia there is an impairment in function of many physiological homeostatic mechanisms. There is a defect in adaptation of the internal environment of the organism to changing conditions.

Constancy of perception and conceptual, symbolic thinking may be viewed also as homeostatic mechanisms, which aim at maintaining the external, behavioural environment of the organism within certain limits stable. The importance of it for the adaptation of the organism is quite obvious. It allows us to live in a world of definite and probable things, which can be classified in a predictable way, and which display certain regularities of appearance and behaviour. These regularities in their turn are abstracted, codified and expressed in the form of symbols. It is possible that in schizophrenia there is a breakdown of these higher homeostatic mechanisms, a breakdown of co-ordination of various functions, although the individual functions are not affected.

Raush's findings indicate a possibility of existence in early schizophrenics and in some chronic schizophrenics of a compensatory, although more primitive mechanism, by means of which the individual endeavours to stabilize the breaking down, behavioural environment. Constancy of perception in these patients is higher than in normals and also a watertight system of delusions is created. On the other hand, however, these phenomena may be due to a disorder of homeostasis in the opposite direction: the behavioural environment becomes too constant, too unchanging to be compatible with the physical, external

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press

environment. This, of course, leads to a breakdown of adjustment. Be this as it may, one conclusion appears to be certain—schizophrenia leads to subtle perceptual disorders, which in their turn influence the course of the disease.

Summary

1. It was found that size constancy of perception in chronic schizophrenics belonging mainly to the hebephrenic type, who have been many years in the hospitals, was lower than that in normal controls and non-schizophrenic patients.
2. There is a possibility that this may be related to disorder of thought.
3. The schizophrenics showed a greater variability in the performance in the individual experiments, than both the normals and non-schizophrenics.
4. The implications of these phenomena for the schizophrenic process are discussed.

Acknowledgments

I would like to express my gratitude to Rockefeller's Foundation and the Federal Research Fund whose grants made this study possible. I would also like to express my gratitude to Mr. R. Hall, the Psychiatric Research Nurse at Saskatchewan Hospital, Weyburn, for his help with the experiments, and to Dr. H. F. Osmond, the Physician Superintendent of the Saskatchewan Hospital, Weyburn, Dr. A. Hoffer, the Director of Psychiatric Research in Saskatchewan, Mr. J. N. Agnew, the Research Psychologist at Saskatchewan University, Professor G. McMurray, Head of the Department of Psychology, Saskatchewan University and Dr. H. L. Raush of the National Institute of Health, Bethesda, for their help, encouragement and criticism.

References

1. Bruner, J. S., "Personality Dynamics and the Process of Perceiving", in *Perception an Approach to Personality* (edited by R. R. Blake and G. V. Ramsay), 1951. New York: Ronald Press Company.
2. Brunswik, E., "Zur Entwicklung der Albedowahrnehmung", *Z. Psychol.*, 1929, **109**, 40–115.
3. *Idem*, *Wahrnehmung und Gegenstandswelt—Grundlegung einer Psychologie vom Gegenstandlehr*, 1934. Leipzig: Denticke.
4. Fenichel, O., *The Psychoanalytic Theory of Neurosis*, 1945. New York: Norton.
5. Gellhorn, E., *Physiological Foundation of Neurology and Psychiatry*, 1953. Minneapolis: The University of Minnesota Press.
6. Gibson, J. J., *The Perception of the Visual World*, 1950. Boston: Houghton Mifflin.
7. Hilgard, E. R., "The Role of Learning in Perception", in *Perception an Approach to Personality* (edited by R. R. Blake and G. V. Ramsay), 1951. New York: Ronald Press Company.
8. Holaday, B. E., "Die Grossenkonstanz der Sehdinge". No. 2 of "Untersuchungen über Wahrnehmungsgegenstande" (edited by Brunswik), *Arch. ges. Psychol.*, 1933, **88**, 419–86.
9. Holway, A. H., and Boring, E. G., "Determinations of Apparent Visual Size with Distance Variant", *Amer. J. Psychol.*, 1941, **54**, 21–37.
10. Hoskins, R. G., *Biology of Schizophrenia*, 1946. New York: Norton.
11. Raush, H. L., "Perceptual Constancy in Schizophrenia", *J. Person.*, 1951, **46**, 131–1941.
12. *Idem*, "Object Constancy in Schizophrenia: The Enhancement of Symbolic Objects and Conceptual Stability", *J. Abnor. Soc. Psychol.*, 1956, **53**, 2, 231–34.
13. Reynolds, G. A., *Perceptual Co[illegible]cy in "Schizophrenics" and "Normals"*, Ph.D. Thesis (unpublished), 1953. Pur[illegible]versity.

https://doi.org/10.1192/bjp.103.432.475 Published online by Cambridge University Press