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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

"Une malade me disant entendre des voix non par les oreilles mais en elle-même, m'indique sa région épisgastrique comme en étant le siège. Je fais cette hypothèse d'hallucinations psycho-motrices avec contractions du diaphragme qui localiserait lesdites hallucinations, et il me vient à l'idée d'ausculter le creux épisgastrique de cette malade. Or quelle n'est pas ma surprise d'entendre en effet les voix comme venant de cette région, tout un bavardage, d'ailleurs indistinct et cependant très proche, mais sans percevoir aucune contraction diaphragmatique. J'éloigne le stéthoscope biauriculaire dont je m'étais servi, plus rien...; et la malade interrogée dit n'avoir elle-même rien entendu. Je renouvelle l'expérience. De nouveau un bruit de conversation. Seulement, ayant enlevé l'appareil de mes oreilles, je perçois alors dans le lointain (soit dans la cour voisine, soit dans une autre salle) un échange de propos... J'ausculte de nouveau et j'arrive à cette conclusion qu'une transmission probable par le plancher et le corps de la malade altère et rapproche ces voix réelles. Dans le cas présent la malade ne les percevait pas; mais n'arrive-t-il pas que des transmissions de ce genre soient muées en hallucinations? On peut toujours se demander quel rôle jouent dans le phénomène pathologique ces inconscients avec lesquels nous vivons."

(Simon, 1937)

"M. Simon a raison... La maladie mentale ne crée pas plus de phénomènes absolument nouveaux que la maladie physique n'en réalise, ainsi que le remarquait Claude Bernard. La maladie mentale, comme la maladie physique, augmente ou réduit et surtout déforme les phénomènes normaux et on ne peut comprendre le phénomène pathologique qu'en montrant la transformation qu'ont subie les fonctions normales correspondantes."

(Janet, 1937)

"God gives the nuts, but he does not crack them."

(Goethe)

Research on schizophrenia consists mainly of reports of differences between one or more "schizophrenic" groups and one or more control groups (Fisher, 1972; Schooler & Feldman, 1967). This is true of the biological-physiological as well as the "psychological" approach. Since some loss of perceptual, cognitive or psychomotor capacity is often observed in psychiatric disorders, the term "psychological deficit", which has been coined by Hunt and Cofer (1944) is used to refer to such loss. The literature is replete with reports of deficits in "schizophrenics" as compared to "normals". However, when these various studies are replicated, with or without methodological changes, inconsistency of findings tends to be the rule. In fact, according to Zimet and Fishman (1970), there is not one aspect of the deficit literature which has not been contradicted.

There are several reasons for this state of affairs. One of the most important is the non-comparability of subjects studied by various investigators. The heterogeneity of schizophrenic populations, and the uncertain reliability of psychiatric diagnoses, have long been recognized (Ash, 1949; Garmezy & Rodnick, 1970; Stoller & Guertsma, 1963). As early as 1948, Bellak urged researchers in the field to differentiate between sub-groups of schizophrenics so that sampling procedures might become more uniform and results easier to interpret.

The most noticeable difference between patients diagnosed as schizophrenic and the first to be identified (Bleuler, 1930, 1936) was that some recover while others do not. Many researchers (Langfeldt, 1951; Milici, 1939; Paskind & Brown, 1940; Stalker, 1939; Strauss, 1931)

attempted to identify the particular characteristics which differentiated remitted from unremitted schizophrenics. It was found that outcome in schizophrenia was closely associated with the patient's past history, the nature of the onset of disturbance (e.g. "acute and abrupt" versus "insidious and gradual"), and with the absence or presence of precipitating factors (Kantor & Herron, 1966). Further research stimulated by these findings led to the inclusion of additional characteristics, and eventually to the development of scales specifically designed to rate good versus poor prognosis in patients diagnosed as schizophrenics (Becker, 1955; Phillips, 1953; Wittman, 1941).

Using the terms introduced by Kretschmer (1925) to differentiate a group of malignant types from a group with a more benign prognosis, those in the former category were referred to as "process" and those in the latter as "reactive". Further scales were developed (Johnson & Ries, 1966; Kantor, Wallner & Winder, 1953; Ullmann & Giovannoni, 1964). In the past fifteen years, the process-reactive classification of schizophrenic populations has become the major mode of reducing sample heterogeneity for research purposes (Kantor & Herron, 1966; Kilburt & Siegel, 1973). However, this apparently promising method of grouping schizophrenic subjects has not reduced the incidence of contradictory results among researchers. According to Higgins (1969) it appears that for every study supporting the efficacy of the process-reactive concept, two non-supportive ones can be cited. Whatever construct is measured by each of the various scales cited

above, none appears sufficiently characteristic of a given schizophrenic group to reduce significantly the large intersubject variability.

Another attempt to deal with the problem of diversity among patients labeled "schizophrenic" has been to define schizophrenia in purely symptomatological terms (Bleuler, 1972; Schneider, 1957). Schneider's first-order symptoms, which have empirically turned out to be of the greatest diagnostic relevance (WHO, 1975) consists of 1) auditory hallucinations, 2) feelings of influence, 3) spreading of one's own thought to others, and 4) delusions (Freedman, Kaplan & Sadock, 1972).

The International Pilot Study of Schizophrenia (IPSS - WHO, 1975) reported that a group diagnosed as schizophrenic by three separate procedures and referred to as the "concordant" group, was characterized by the following symptoms: 1) lack of insight (97%), 2) auditory hallucinations (74%), 3) verbal hallucinations (70%), and 4) delusions (67%). As may be noted, two of these symptoms, auditory hallucinations and delusions, are common to both Schneider's and the IPSS' listings. Strauss (1969) also pointed out that hallucinations and delusions are key symptoms in the conceptualization and diagnosis of schizophrenia. Despite this consensus, and the finding that overt disruptive symptomatology is more important than specific diagnosis in producing cognitive deficit (Craig, 1970; Crumpton, 1963; Schwartz, 1967) only a small number of studies have investigated the relationship between the relative presence of such symptoms in a schizophrenic sample, and performance on some perceptual and cognitive tasks.

A few investigations dealing with the question of differences

between delusional and nondelusional schizophrenics have been conducted. Measuring degree of inclusiveness, no difference was found by Goldstein and Salzman (1965) between the two groups on the Gorham Proverb test. On the other hand, Payne, Caird and Laverty (1964) reported that delusional groups achieved the highest over-inclusive scores on the Benjamin Proverb test. Since delusions constitute the primary symptom for a diagnosis of paranoid schizophrenia (Freedman et al, 1972), the large number of studies comparing paranoid to nonparanoid schizophrenics may be regarded as comparisons between delusional and nondelusional schizophrenics. If this assumption is correct, then, once again, results of such studies have been inconclusive and often contradictory (Schooler & Feldman, 1967; Zimet & Fishman, 1970). However, no studies evaluating the performance of delusional or paranoid schizophrenics have partialed out the effect of hallucinations as a possibly confounding factor. Yet, Lewinsohn (1970) reported that hallucinations were present in 35% of delusional schizophrenics. Moreover, it was found that schizophrenics who reported hallucinations had a higher probability of having received a diagnosis of "paranoid" schizophrenia than those who did not (Lowe, 1973; WHO, 1975).

Reports of incidence of hallucinations in a hospitalized schizophrenic population vary between 30% (Lewinsohn, 1967) and 76% (Mott, Small & Anderson, 1965; Sedman, 1966). On the other hand, the probability of being diagnosed schizophrenic when hallucinations are present has been found to be .84 (Lewinsohn, 1967; 1970). Moreover, the report of hallucinations as a single symptom seems to

be a sufficient condition for admission to a mental hospital with a diagnosis of schizophrenia (Rosenhan, 1973).

The number of experimental studies concentrating on this particular symptom has been relatively small. Roman and Landis (1945) found no relationship between the type of imagery experienced by schizophrenics and the type of hallucinations which they are prone to have. Mintz and Alpert (1972), on the other hand, found that it was not the type but the vividness of imagery which was characteristic of hallucinating schizophrenics. However, as was pointed out by Savage (1975), the meaning of the term "vividness" is ambiguous. It may mean "bright", "lifelike", outwardly "projected", or "compelling". This semantic ambiguity renders the interpretation of such results very difficult and potentially confusing.

The tendency to visual completion effect in hallucinating schizophrenics was investigated by Caston (1969). He concluded that hallucinators showed a significantly higher tendency to visual completion than nonhallucinators. However, in measuring the ability to perceive an illusionary whole, Caston included patients reporting hallucinations, or pseudo-hallucinations, or illusions in his hallucinatory group. Consequently, the differences observed might simply reflect a higher capacity for closure in his sub-group of "illusionary" and pseudo-hallucinatory patients. According to Chaplin (1973) illusions always involve the distortion of stimulus patterns whereas hallucinations bear no relationship with the actual, commonly perceived world. There is as yet no experimental evidence for assuming a relationship between capacity to perceive an illusion

and propensity to hallucinate. A few studies have investigated the relationship between personality variables and presence of hallucinations in schizophrenics. Hallucinating schizophrenics were found to be more disorganized, less able to pursue constructive plans and demonstrated poor ego-strength on the Minnesota Multiphasic Personality Inventory (Lewinsohn, 1967). They also obtained higher psychoticism scores on the Eysenck Personality Inventory (Eysenck & Eysenck, 1973) than both normal subjects and nonhallucinating schizophrenics (Slade, 1976). On the other hand, Sedman (1966) found no relationship between various personality types, as categorized by Schneider (1958), and hallucinations in schizophrenia. Lewinsohn (1967) also reported that hallucinating schizophrenics were rated by other patients as more friendly, less defensive, more likeable and more desirable as roommates than nonhallucinating patients. A relationship between hallucinations and physiological abnormalities in schizophrenics has recently been reported. Trying to account for the high variability of electrodermal recovery scores within a schizophrenic population, Mednick (Note 1) observed a highly significant correlation ($p < .0005$) between fast recovery and presence of hallucinations and delusions. Further analysis of his data has shown that hallucinations played a more important role than delusions in accounting for fast recovery. The relationship between anxiety or arousal and presence of hallucinations in schizophrenics has also been noted by several investigators (Cowen, 1970; Lapidus & Schmolling, 1975; Slade, 1972, 1974; Will, 1962). It appears reasonable to assume that a high level of anxiety has significant

decremental effects on performance of psychological tasks, and that some of the contradictory findings in the deficit literature may be explained by the variable presence of hallucinations in the samples studied.

The paucity of research concerned with the effect of hallucinations on performance could be due to the methodological difficulties involved in this type of studies. First, one has to contend with the fact that the presence or absence of the symptom is assessed by means of self-report which is not subject to objective reliability checks (Bindra, 1959). However, when a certain phenomenon is consistently reported by a significant number of individuals, naive as to the purpose of the interview or the experiment, it is valid to consider self-report as reliable data (Hebb, Note 2). Another difficulty is the fact that reports of hallucinations and their various characteristics are often retrospective and consequently subject to distortions (Lowe, 1973; Mott, Small & Anderson, 1965). One way to reduce the probability of such distortions is to restrict the sample to those patients who report current as opposed to only past hallucinations. A further problem associated with this type of research is to select an appropriate and reliable definition of the concept of hallucinations.

Despite the fact that some definitions of hallucinations reflect differing theoretical orientations (Fisher, 1970, 1975; Harris, 1970; Itil, 1970) most authors agree that hallucinations are sensory-perceptual phenomena having the following characteristics: 1) they occur spontaneously, 2) they originate internally, but are externally

attributed, 3) they occur without concrete external stimuli, and in this sense, are strictly private experiences, 4) they have the impact of a real perception, and finally 5) they are unwilled experiences (Bertalanffy, 1966; Caston, 1969; Chaplin, 1973; Clouston, 1884; Forgus & Dewolfe, 1969; Forrer, 1970; Freedman et al, 1972; Hinsie & Campbell, 1974; Horowitz, 1975; Jarvik, 1970; Mott et al, 1965; Shurley, 1962; Slade, 1976; Smith, 1935; Solomon & Mendelson, 1962; Winters, 1975). A pseudo-hallucination is said to lack the character of "objective reality" (Siegel & Jarvik, 1975), it is perceived through the senses, but is not experienced as a veridical perception originating from the physical world (Sedman, 1966). A delusion, on the other hand, is a cognitive rather than a perceptual-sensory phenomenon. It is primarily a false belief which resists correction by ordinary processes of logical thought (Chaplin, 1973; Smith, 1935).

Although the symptom of hallucinations is not particular to schizophrenia and has been observed in other conditions such as brain stimulation (Horowitz & Adams, 1970), alcoholism (Harrison, 1974), sensory and sleep deprivation (Siegel & West, 1975; West, 1962), and drug-induced states (Fisher, 1975), the prevalence of auditory hallucinations seems to be more characteristic of the schizophrenic disorder. Seventy-four percent of the IPSS' concordant group reported auditory hallucinations whereas less than 20% experienced hallucinations in other sense modalities including the visual. As can be seen in Table 1, there is a high level of consistency in researchers' reports of incidence of auditory hallucinations in schizophrenia. This consensus is all the

TABLE 1

Studies reporting the incidence of modality-specific hallucinations in hospitalized schizophrenics

AUTHORS	HALLUCINATIONS*			
	Auditory	Visual	Tactile	Olfactory
Hill (1936)	68%	14%	11%	5%
Roman & Landis (1945)	100%	10%	5%	5%
Malitz, Wilkens & Esecovet (1962)	50%	9%		
Mott, Small & Anderson (1965)	66%	24%	28%	
Small, Small & Andersen (1966)	66%	30%	42%	38%
Thomas (1967)	69%	63%	31%	6%
Goodwin, Alderson & Rosenthal (1971)	87%	64%	53%	20%
Zarroug (1975)	68%	62%		

* The same patient may report hallucinations in several modalities.

more noteworthy given the fact that one sample examined was French (Thomas, 1967), another Saudi-Arabian (Zarroug, 1975) while the remaining groups were American. Moreover, there seems to have been no difference between the incidence of auditory hallucinations reported in 1936 by Hill, and those reported in the sixties. The only other conditions under which auditory hallucinations seem to predominate are cases of chronic abuse of bromides (Levin, 1960), alcohol (Harrison, 1974; Smith, 1935; Victor & Hope, 1963) and amphetamine (Fisher, 1972). As indicated in Table 1, the reports of incidence of hallucinations in modalities other than auditory are much less consistent. However, it is very difficult to find reasons for this discrepancy since most studies only mention the rate of occurrence without discussing particulars such as the relative frequency of these types of hallucinations. The few studies reporting on these aspects stated that such hallucinations were usually sporadic and relatively infrequent (Lang, 1938; Linn, 1977; Mott et al, 1966; Sedman, 1966; Small et al, 1966).

The significance of modality-specific hallucinations in the prediction of outcome in schizophrenia was investigated by a number of researchers. Lewinsohn (1967) found no relationship between hallucinations of any kind and outcome, whereas studies by Hill (1936), and by McCabe, Fowler, Cadoret & Winokur (1972) reported a positive association between good prognosis and visual hallucinations, irrespective of hallucinations in other sense modalities. On the other hand, the longer the duration of hallucinations, again independent of modality, the worse the prognosis (Hill, 1936).

It is reassuring to find that in a field of research characterized by contradictions and inconsistencies, one area elicits a high consensus among researchers. There appears to be no contradictory reports on the various characteristics of hallucinations in schizophrenia.

The main difference between the hallucinations of normal and schizophrenic individuals is the belief in the physical reality of the experience. Although the experience is reported as very "real" by normals (Fisher, 1970, 1972, 1975; Linn, 1977; Medlicott, 1958), these recognize that it did not originate in the outside world but inside them. By contrast, schizophrenics attribute their hallucinations to the influence of others (Goodwin et al, 1971; Lang, 1938, 1939; Linn, 1977; Mott et al, 1965; Roman & Landis, 1945; Sedman, 1966; Simon, 1937). Moreover, hallucinations in normals are usually of brief duration and unlikely to recur (Linn, 1977) whereas in schizophrenics they are often continuous and recur over years (Lang, 1938, 1939; Mott et al, 1965; Sedman, 1966; Simon, 1937).

The content of hallucinations commonly finds its origin in the life experiences of the individual (Feinberg, 1962; Fisher, 1972; Schilder, 1933; Small et al, 1966; Will, 1962). This has also been observed with normals during sensory deprivation (Solomon & Mendelson, 1962; West, 1975). Patients' visions are usually seen in colours and portray people of normal size and shape (Small et al, 1966). Flashes of light are also commonly reported (Goodwin et al, 1971; West, 1975). Voices are beyond the control of patients (Goodwin et al, 1971; Hollender & Boszormenyi-Nagy, 1958; Linn, 1977; Mersky & Tonge, 1974; Schilder,

1933; Simon, 1937) and usually address the patients directly, giving instructions and sometimes persecuting them (Alpert & Silvers, 1970; Linn, 1977; Mott et al, 1965). Most hallucinations are experienced as unpleasant and often frightening (Dretler, 1934; Linn, 1977; Mott et al, 1965; Roman & Landis, 1945; Small et al 1966).

In view of the high level of agreement between researchers as to what constitutes a "true" hallucination, a definition including all of the five characteristics listed earlier could be considered valid. In addition, the reliability of a classification method based on the presence of hallucinations would be increased by considering only those patients whose hallucinatory reports included all of these characteristics.

The main purpose of the present study was to investigate the utility of the hallucinatory mode of classification for reducing the heterogeneity of samples of schizophrenics. The second aim of this study was to determine whether descriptions of hallucinations provided by this particular sample of schizophrenics were consistent with those given by schizophrenics in previous investigations. The presence of commonly reported hallucinatory characteristics would increase the probability of obtaining a reliable group of hallucinators.

To demonstrate the effectiveness of a particular method of classification, it is necessary to show that its level of discrimination, in a particular sample, is superior to an existing method. A third aim, therefore, was to compare the hallucinating-nonhallucinating mode of classification with the process-reactive method of group division.

Self-administered, as opposed to interviewer-administered, process-reactive measures were used because, according to Ullmann & Giovannoni (1964), and to Johnson & Ries (1966), the former were designed to reduce dependency on patients' files and to obtain the necessary information in a more efficient way. This also assured that every patient was dealing with a standard set of questions. The two self-report process-reactive scales currently in use were administered in order to assess their inter-relationship.

Five experimental measures were chosen so as to examine for possible group differences. They were selected on the following basis: a) one measure was reported (Bemporad, 1967) to have clearly differentiated between schizophrenic and control groups, the former showing a large performance decrement; b) two measures were representative of intelligence scale sub-tests known to produce poorer performance in schizophrenic subjects; and finally, c) two measures, typical of the deficit literature, had consistently elicited equivocal findings in schizophrenics.

1) The Pseudo Isochromatic Plates for Testing Color Perception (American Optical Association) were used by Bemporad (1967) as a measure of perceptual disorder in schizophrenia. Upon the observation of a very large mean difference between the schizophrenic and the control groups, the author concluded that "a disintegration of perceptual mode from the perception of wholes to the perception of parts occurs in schizophrenia" (p. 974).

2) Picture completion tests which are designed to measure visual

discrimination of familiar details (Wechsler, 1958) were reported to elicit impoverished performance in schizophrenic patients (Penrose, 1945; Prado & Schnadt, 1965; Wechsler, 1944). Moreover, significant decrements in score were observed in hospitalized schizophrenic patients when compared with ex-patients and normal subjects after a nine-year time interval (Schwartzman & Douglas, 1962). Although such findings have stimulated research on the variables underlying poor visual discrimination of familiar objects in schizophrenia (Garmezy & Rodnick, 1970), there are no recent studies validating earlier reports.

3) Error recognition measures, like picture completion, have been reported to produce poor performance in schizophrenic patients (Penrose, 1945; Schwartzman & Douglas, 1962; Schwartzman, Douglas & Muir, 1962; Wechsler, 1944). This type of task has also been referred to as the "picture absurdities" or the "picture anomalies" test. It is designed to measure basic perceptual and conceptual abilities involved in visual recognition and identification of familiar objects (Wechsler, 1958).

4) Reminiscence effect has been defined as an increase in retention which occurs over time in the absence of formal practice (Garmezy & Rodnick, 1970). Studies assessing the reminiscence or practice effect (the two terms are often used interchangeably - Schooler & Feldman, 1967) are difficult to compare due to differences in the relative massing or spacing of the original practice session. The "rest" following practice has varied from as little as one minute (Venables & Tizard, 1956) to as much as three months (Huston & Shakow, 1948). Results seem to reflect this procedural variability.

Two "massed" practice (practice within a period of a day or less) studies (Huston & Shakow, 1948; Venables & Tizard, 1956) and two "spaced" practice (practice in more than one day - Broadhurst, 1958) ones (O'Conner, 1957; Venables, 1959) reported less practice effect in schizophrenics than in normals. On the other hand, three spaced practice studies (Broadhurst, 1958; Huston & Shakow, 1948, 1949) reported more learning in schizophrenics compared with normals. Two other studies (Higgins & Mednick, 1963; Peters, 1953), comparing the performance of acute and chronic schizophrenics, found that learning occurred in acute but not in chronic patients. To complete this round of inconsistencies, one massed practice study (Hall & Crookes, 1951) found very large intra-group variability in their schizophrenic patients thus preventing interpretation regarding the effect of practice.

5) Time estimation studies have consistently reported a large intersubject variability in schizophrenic populations. This was true for short-time estimation (Dobson, 1954; Guertin & Rabin, 1960; Normington, 1967) as well as for long-time estimation (Guertin & Rabin, 1960; Orme, 1966; Rabin, 1957). Moreover, whether or not the time was filled (subject was occupied at a task or idle), or whether it was specified (e.g. "tell me when one minute has passed") or unspecified (e.g. "tell me how much time has passed since...") the results consistently demonstrated high intra-group variability in schizophrenics compared to non-schizophrenic groups (Dobson, 1954; Orme, 1962, 1964; Rabin, 1957; Warm, Morris & Kew, 1963).

Normington (1967) using the Becker-Elgin Revised Scale, found more

variability and less accuracy of time estimation in process schizophrenics than in both reactive schizophrenics and normals, whereas Petzel & Johnson (1972) found no such difference between their process and reactive schizophrenic subjects classified according to the Phillips scale. Broadhurst (1969) reported a tendency in chronic schizophrenics to overestimate five minutes of filled time while Petzel & Johnson (1972) reported a tendency, in a similar chronic group, to underestimate 30 seconds of non-filled time. Again the results appear contradictory.

Using the above measures, the aims of the present investigation, therefore, were a) to determine whether or not the presence of reported hallucinations disrupted the performance of schizophrenic patients, b) to evaluate and describe distinguishing characteristics of the hallucinating experience in patients diagnosed as schizophrenic, and c) to compare the hallucinating-nonhallucinating mode of classification with the process-reactive dimension.

METHOD

Subjects

The present study examined four groups each consisting of 15 subjects. There were two schizophrenic groups: hallucinating schizophrenics (HS) and nonhallucinating schizophrenics (NHS); and two control groups: non schizophrenic psychiatric patients (CP) and normal individuals (CN). The initial screening excluded candidate subjects presenting with any of the following characteristics: 1) age beyond the range of 20 to 44 years; 2) regular abuse of alcohol; 3) abuse of drugs acting on the CNS with the exception of prescribed neuroleptics or other medication; 4) mental retardation; 5) psychosis attributable to endocrine, metabolic or nutritional disorders; 6) evidence of acute or chronic brain syndrome; 7) epilepsy; 8) electroshock treatments within the six months prior to testing.

All groups were equated for gender (five females and 10 males per group), age, education, and vocabulary score (see Table 2). Analysis of variance indicated no differences between groups on these variables. The subjects of the three psychiatric groups were patients hospitalized at the Allan Memorial Institute, and Douglas Hospital in Montréal. The normal group consisted of volunteers who were either visitors or hospital personnel. The information needed to screen candidate subjects was obtained from hospital files for the three psychiatric groups and from a written questionnaire completed by CN candidates (see Appendix I).

Psychiatric diagnoses were assigned to patients by the ward staff

TABLE 2

Means, Standard Deviations and ANOVA source tables for age in years, education level (highest grade completed) and Wide-Range Vocabulary score (form B) for the hallucinating schizophrenic (HS), the non-hallucinating schizophrenic (NHS), the non-schizophrenic psychiatric control (CP), and the normal control (CN) groups.

	Age		Education		Vocabulary	
Groups	M	SD	M	SD	M	SD
HS	29.07	6.91	11.27	2.84	52.87	16.87
NHS	28.93	7.44	11.40	1.88	54.0	16.62
CP	28.67	7.48	11.47	2.36	54.33	17.90
CN	29.13	6.53	11.4	2.32	54.33	17.31

ANOVA SOURCE TABLES

Source	df	SS	MS	F	Prob.
AGE					
Between groups	3	1.917	0.6389	0.0127	ns
Within groups	56	2824.9	50.445		
EDUCATION					
Between groups	3	0.3167	0.1056	0.0187	ns
Within groups	56	315.867	5.6405		
VOCABULARY					
Between groups	3	2.533	0.8444	0.0029	ns
Within groups	56	16072.4	287.007		

working as a team, or by the chief psychiatrist. Diagnostic information was obtained from the medical charts of patients (see Table 3). The presence or absence of hallucinations was assessed on the basis of a structured interview with patients and a questionnaire completed by the staff (see Appendix II). Only those patients reporting current hallucinations were included in the HS group; only those patients reporting no current or past hallucinatory experiences were included in the NHS and CP groups. Any patient who had received a diagnosis of schizophrenia in the past which was subsequently changed to another diagnosis was excluded from the study.

The mean unit level of daily neuroleptic drugs prescribed was 11.67 (SD: 9.56) for the HS group, and 14.67 (SD: 15.52) for the NHS group. The unit level measure was calculated by the conversion to and summing of equivalent dosage strengths of the neuroleptic drugs given by Ban (1973, pp. 56-57). For example, 100 milligrams of chlorpromazine was rated equivalent in dosage strength to two milligrams of haloperidol; both these dosages were given a score of one unit. If a patient received 600 mgs. of chlorpromazine or 12 mgs. of haloperidol per day, and no other neuroleptics, the daily level of medication attributed to this patient was six units. The mean total number of weeks of hospitalization, including past hospitalizations, was 117.2 (SD: 205.94) for the HS group, 51.3 (SD: 84.57) for the NHS group, and 30.20 (SD: 42.11) for the CP group.

TABLE 3

Diagnoses of the hallucinating schizophrenic group (HS), the nonhallucinating schizophrenic group (NHS), and the nonschizophrenic psychiatric control group (CP)

DIAGNOSES	NUMBER OF PATIENTS		
	HS	NHS	CP
Schizophrenia, acute	3	1	–
chronic	–	2	–
paranoid	12	5	–
simple	–	3	–
undifferentiated	–	4	–
Manic-depressive psychosis	–	–	6
Neurotic depression	–	–	6
Psychotic depression	–	–	2
Anorexia nervosa	–	–	1

Materials

Screening instruments.

1. A Hallucination Inventory was constructed on the basis of questionnaires developed by Feinberg (1962), Freedman and Chapman (1973), Goodwin et al (1971), and Slade (1972) (see Appendix III).

2. The Ullmann & Giovannoni Process-Reactive Self-Report Scale (UG scale) (see Appendix IV).

Intended as a measure of the process-reactive continuum (Ullmann & Giovannoni, 1964), the scale consists of 24 true-false items scored in the reactive direction and designed to predict post-hospital employment. Since it was validated on a male sample, some of the items had to be modified for use with female patients (see Appendix V). As there are no directives provided by the scale regarding cut-off scores, a score of 13 or above was considered "reactive" and a score of 11 or less was considered "process". Any subject with a score of 12 was not included in the data analysis which involved the UG scale as a method of group classification.

3. The Johnson & Ries Process-Reactive Self-Report Scale (JR scale) (see Appendix VI).

The JR scale consists of 35 true-false items selected from the Phillips Prognostic Rating Scale (Phillips, 1953). This scale is also scored in the reactive direction, and like the UG scale, does not provide any clear-cut directives as to cut-off scores. Hence, a score of 18 or above was classified "reactive", and a score of 17 or below was classified "process". An adaptation of items for use with female subjects was also made (see Appendix VII).

4. The Wide Range Vocabulary Test, form B.

Devised by Atwell and Wells (1937) and based on the Stanford-Binet vocabulary measure, the Wide Range Vocabulary Test offers five choices for each of the 100 words comprising the test. Form B presents the stimulus words in order of difficulty for school grades 6, 8, 10, 11, and College Junior and Senior levels. Form B has been recommended by the authors for clinical use because testing can be terminated when items become too difficult for the subject. The test which is said to "provide rapid and accurate determination of scholastic intelligence for literate individuals" (Atwell & Wells, Manual of Directions) was administered to each subject to rule out mental retardation and to control for differing intellectual skills among the groups.

Experimental measures.

1. Pseudo-Isochromatic Plates for Testing Color Perception (PIP) (American Optical Association).

Four plates were used which showed the numbers 86, 56, 25, and 12 respectively. The numbers imbedded in the three first cards are not clearly outlined whereas no. 12 on the last card is very easily recognizable and offers little opportunity for misinterpretation. These were the plates used by Bemporad (1967); their administration was intended as a replication of Bemporad's study.

2. Picture Completion (PC).

This test was taken from the Revised Beta Examination (Lindner

& Gurvitz, 1946) and constitutes test no. 5 in the Booklet. It consists of four practice exercises and 20 test items. Subjects draw in the essential missing feature in order to complete the picture shown. A correct answer is scored one point, and the maximum possible total score is 20 points.

3. Error Recognition (ER).

This test constitutes test no. 3 in the Booklet of the Revised Beta Examination. It consists of six practice exercises and 20 test items. Each of the items presents four scenes one of which is inappropriate. A correct identification is scored one point and a maximum possible total score is 20 points.

4. Practice or Reminiscence Effect.

The reminiscence effect was investigated by means of a second administration of the PC and ER tasks.

5. Time Estimation.

Estimate of a specified, unfilled one-minute time estimation.

Procedure

Every patient's file was examined in order to develop a list of patients eligible for inclusion in the study. The experimenter was introduced as a researcher to each potential subject by a member of the ward staff. All patients were informed that the investigator was not a member of the hospital staff and that the interview to be arranged was for research purposes. The patients were assured of anonymity in the use of interview material and test results; they were

also told that approximately one hour of their time would be needed. If the patients consented to participate in the study, an appointment was arranged.

The session began with an open-ended interview concerning the reasons which brought the patient to hospital. Questions with regard to hallucinations, past or present, and self-administration of drugs such as hallucinogens or amphetamines, were checked out during this interview. Since patients were not told in advance that they would be asked to perform a number of tasks, it was possible to exclude those who did not meet all the criteria for inclusion in the study without difficulty. The session was brought to a close with completion of the interview. Patients reporting current hallucinations were encouraged to elaborate on their responses and all questions of the Hallucination Inventory were covered in an open-ended manner. All patients were cooperative. The patient's participation was then requested for a test period of approximately half-an-hour. Again, all patients agreed to participate.

Normal subjects were informed as to the purpose of the study, received assurance of anonymity, and were told of the time requirements. They were then asked to complete a questionnaire which assessed the presence of exclusion criteria, including psychiatric history. All suitable normal subjects agreed to participate. Following this phase, the testing procedure was identical for all four groups. The order of test presentation was randomized within each group by means of the random number key of the SR-51A pocket calculator (Texas Instruments).

The randomized order was identical across the groups (see Appendix VIII).

Test 1: One-minute time estimation.

Each Subject was instructed to say "stop" when he or she thought that one minute had elapsed after the signal "go" was given by the experimenter. To be certain that all Subjects understood the procedure, they were asked to repeat the instructions in their own words. The investigator started a stopwatch simultaneously with the "go" signal. When the Subject indicated that one minute had gone by, timing was immediately terminated and the number of seconds registered on the stopwatch was recorded.

Test 2: Picture Completion.

The procedure outlined in the Revised Beta Examination manual (Kellogg & Morton, 1957) was followed. Once it was clear that the subjects understood the task to be performed, they were told to commence and to work as quickly as they could. The experimenter started timing for 2½ minutes after which the test sheet was removed.

Test 3: Error Recognition.

The above procedure as described in the Revised Beta Examination manual was followed; each subject was allowed three minutes to complete the task.

Test 4: Pseudo-Isochromatic Plates.

The four plates were presented one by one in the following order: plate showing number 86; number 56; number 25; and number 12. Subjects were told: "Describe everything that you can see on this

card". Every answer was recorded, and each card was displayed until the Subject notified the experimenter that that was all he or she could see.

As noted earlier, the order of presentation of the four tests varied within groups, but was constant between groups. To assess for reminiscence effect, the PC and ER tests were readministered to each Subject within the assigned order of tests for a given Subject. If the Subjects asked questions, they were told that this was being done to assess their performance a second time and that they could change their answers or repeat them as they wished. The first administration of PC and ER is referred to as "PCI" and "ERI" respectively, and the second administration as "PCII" and "ERII".

All Subjects, except for the CN group, were asked to complete the two process-reactive self-report scales. Both scales were made available to the Subject at the same time, and the order of their completion was dictated by Subject preference. Subjects were asked to answer every question and were again reassured as to the privacy and anonymity of their answers. They were also encouraged to seek clarification if they did not understand items. Since some of the questions in both scales are formulated in double-negatives, the experimenter checked for inconsistencies in the Subject's responses and reformulated for the Subject every question which had elicited a dubious response. The Subject was then left free to change or to retain the answer.

The Wide-Range Vocabulary test comprised the final segment of the

session. Subjects were instructed to go as far as they could, that the words got more and more difficult, and that they were not expected to know the meanings of all of the words. Every Subject agreed to perform this test. At the end of the session, the experimenter offered to disclose and discuss test results with the Subject. Most Subjects availed themselves of this opportunity.

RESULTS

Hallucinatory-nonhallucinatory group classification

Pseudo Isochromatic Plates.

As may be seen in Table 4, there were relatively few errors and no inter-group differences on this test. Most of the errors consisted in seeing an incorrect number rather than no number; in plate one, 86 was mistaken for 88, and in plate two, 56 was mistaken for 66. One patient, in the HS group, missed seeing the numbers imbedded in the first three plates. After he correctly identified "12" in the last plate, he was once more presented with the first three plates, and correctly recognized each of the embedded numbers. However, following Bemporad's procedure, this subject is considered to have failed on these items.

Time estimation.

As can be observed in Table 5, and in Figure 1, time estimation elicited significant variance differences between the groups. The standard deviations of the two schizophrenic groups were more than twice that of the CN group and the standard deviation of the CP group was midway between them. It can also be noted that the scores of the CN group appear normally distributed, whereas this is not the case for the other groups.

In order to reduce the heterogeneity in variance, a logarithmic transformation of scores was computed and the results subjected to a one-way analysis of variance. The main effect of groups was not

TABLE 4

Number of correct responses to the Pseudo Isochromatic Plates given by the hallucinating schizophrenic (HS), the nonhallucinating schizophrenic (NHS), the non-schizophrenic psychiatric control (CP), and the normal control (CN) groups.

GROUPS	Plate 1	Plate 2	Plate 3	Plate 4	Total correct responses
	no. 86	no. 56	no. 25	no. 12	
HS	14	14	14	15	57
NHS	14	13	15	15	57
CP	14	12	15	15	56
CN	14	14	15	15	58

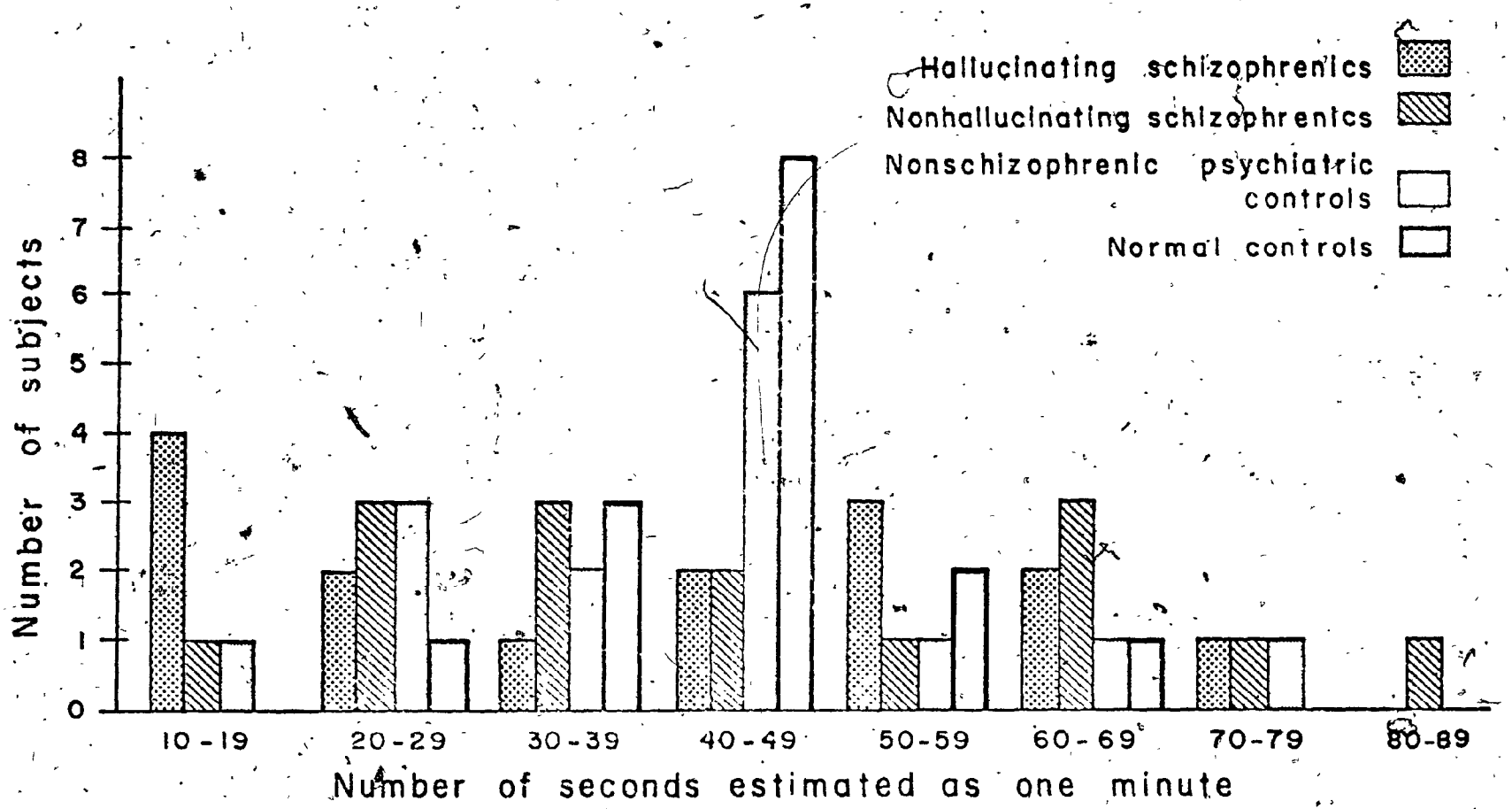
TABLE 5

Mean number of seconds estimated, and ANOVA source table of the time estimation task for the hallucinating schizophrenic (HS), the nonhallucinating schizophrenic (NHS), the non-schizophrenic control (CP), and the normal control (CN) groups.

Groups	M	SD
HS	40.27	21.92
NHS	45.23	20.01
CP	39.20	15.92
CN	43.20	9.61

ANOVA Source Table of the Log. Transformed Scores

Source	df	SS	MS	F	Prob.
Between groups	3	0.4256	0.1419	0.662	ns
Within groups	56	12.0038	0.2144		


Hallucinating schizophrenics
Nonhallucinating schizophrenics
Nonschizophrenic psychiatric controls
Normal controls
Number of subjects
0
1
2
3
4
5
6
7
8
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
Number of seconds estimated as one minute

significant, F (3,56) = 0.662, $p < .59$. The variances of both the original data, and of the log. transformed data, as analysed by the Bartlett-Box technique, were found to be significantly heterogeneous (original data: $F = 3.065$, $p < .03$; transformed data: $F = 4.035$, $p < .03$).

Picture completion.

There was no significant difference in performance between the four groups on PCI and PCII as assessed by a two-way analysis of variance. However, as may be noted in Table 6, there was an overall significant improvement in scores on PCII, F (1,56) = 68.79, $p < .001$, indicating a practice effect for each group.

Error recognition.

A significant improvement in scores was again observed on ERII for all groups, F (1,56) = 58.54, $p < .01$. The main effect of groups was significant, F (3,56) = 8.91, $p < .01$. A Newman-Keuls range test indicated that both the HS and NHS groups scored significantly less than the CN group ($p < .01$) and the CP group ($p < .05$). The CP group also scored significantly less than the CN group ($p < .05$). These group differences in test performance occurred on both ERI and ERII (see Table 7).

Process-reactive group comparisons.

On the basis of their JR scores, 22 patients, regardless of diagnosis, were assigned to the process category. Ten came from the HS group, six from the NHS group and six from the CP group. The

TABLE 6

Mean number of correct responses on Picture Completion, first (PCI) and second (PCII) administrations, and ANOVA source table of mean PCI and PCII for the hallucinating schizophrenic (HS), the nonhallucinating schizophrenic (NHS), the non-schizophrenic psychiatric control (CP), and the normal control (CN) groups.

	PCI		PCII	
Groups	M	SD	M	SD
HS	12.20	3.03	14.47	3.16
NHS	12.73	2.49	14.60	2.72
CP	14.40	3.50	15.73	2.81
CN	14.80	2.73	16.47	2.07

ANOVA Source Table of PCI and PCII Scores

Source	df	SS	MS	F	Prob.
Groups	3	109.158	36.386	2.4619	ns
Error	56	827.667	14.780		
Treatments	1	95.408	95.408	68.7923	$p < .01$
Interaction	3	3.425	1.142	0.8232	ns
Error	56	77.667	1.387		

TABLE 7

Mean number of correct responses on Error Recognition, first (ERI) and second (ERII) administrations, and ANOVA source table of mean ERI and ERII for the hallucinating schizophrenic (HS), the nonhallucinating schizophrenic (NHS), the non-schizophrenic psychiatric control (CP), and the normal control (CN) groups.

	ERI		ERII	
Groups	M	SD	M	SD
HS	8.20	2.86	10.20	3.45
NHS	8.73	3.67	10.53	4.10
CP	11.07	3.67	12.93	3.24
CN	13.93	2.66	15.07	2.22

ANOVA Source Table of ERI and ERII Scores

Source	df	SS	MS	F	Prob.
Groups	3	537.40	179.13	8.9068	$p < .01$
Error	56	1126.27	20.11		
Treatments	1	86.70	86.70	58.5434	$p < .01$
Interaction	3	3.37	1.12	0.7578	ns
Error	56	82.93	1.48		

remaining 23 patients' JR scores placed them in the reactive group. On the basis of their UG scores, 21 patients were assigned to the process group, nine of whom were in the HS group, seven in the NHS group and five in the CP group. Since one patient in the HS group and two in the NHS group scored the borderline 12 on the scale, their test data were not included in this analysis. The remaining 21 patients' UG scores were in the reactive range. The relationship between the two scales, as measured by the Spearman rho, was highly significant, rho = .61, t (43) = 5.029, $p < .001$.

The mean ages, education levels, and vocabulary scores of the process and reactive groups were compared by means of t-tests. The reactive group, as classified by the UG scale, was significantly older than the process group, t (40) = 2.38, $p < .02$. There were no other significant differences.

Pseudo Isochromatic Plates.

The one patient in the HS group who did not see the embedded numbers on the first presentation of the three first plates, scored process on both scales. Two of the patients in the NHS group who misread some embedded numbers scored reactive on both scales, and one scored process, again on both scales. There was, consequently, no difference in performance between the process and reactive groups on this test.

Time estimation.

There were no significant differences between process and reactive groups on the time estimation measure as analysed by t-tests, for both

the JR scale method of classification t (43) = 0.55, p < .59, and the UG scale method, t (40) = 0.22, p < .84.

Picture completion and error recognition

Both process and reactive groups improved significantly on the second administration of PC and of ER. This was true for the JR scale method of classification on PC, F (1,43) = 56.098, p < .001, and on ER, F (1,43) = 49.689, p < .001. The UG scale method of classification yielded similar results on PC, F (1,40) = 42.563, p < .001, and on ER, F (1,40) = 43.364, p < .001. No other significant effects were found.

As the process and reactive scales have mainly been used to classify schizophrenics and not other psychiatric diagnostic groups, the data were reanalysed classifying the Subjects into process schizophrenics, reactive schizophrenics, process psychiatric controls, and reactive psychiatric controls, comparing each of these groups and the normal control group.

Time estimation.

The means of the groups were logarythmically transformed to control for heterogeneity of variances, and subjected to an analysis of variance for each scale. No significant differences among the five groups emerged from the analyses. However, the variances were again found to be significantly different, as demonstrated by the Bartlett-Box test; JR scale: F (4.55) = 4.389, p < .004; UG scale: F (4.52) = 3.122, p < .025.

Picture completion.

There were no significant differences between the group means, on the picture completion test, when compared by means of analysis of variance, JR scale: F (4,55) = 2.405, $p < .07$ (see Table 8); UG scale: F (4,52) = 1,552, $p < .21$ (see Table 10). There was a significant improvement on PC for all groups as classified by the JR scale, F (1,55) = 59,95, $p < .001$, and by the UG scale, F (1,52) = 70.70, $p < .001$, indicating a practice effect for each group.

Error recognition.

Comparison of group means by analysis of variance indicated a significant difference between groups on the ER task; JR scale: F (4,55) = 7.404, $p < .001$ (see Table 9); UG scale: F (4,52) = 5.706, $p < .002$ (see Table 11). The Newman-Keuls test showed that on group classification using either scale, the process and reactive schizophrenic groups scored significantly less than the normal group ($p < .05$); on the JR scale classification only, the process schizophrenic group scored significantly less than the process psychiatric control group on ERI ($p < .05$) but not on ERII. A reminiscence effect was also observed for all groups on ER as classified by the JR scale, F (1,55) = 56.35, $p < .001$, and by the UG scale, F (1,52) = 50.766, $p < .001$.

Pearson product-moment correlation coefficients were calculated to determine the relationship between length of hospitalization and performance on time estimation, PC and ER tests, and between medication intake and the same three variables. None of the correlations reached significance.

TABLE 8

Mean number of correct responses on Picture Completion, first (PCI) and second (PCII) administrations, and ANOVA source table of mean PCI and PCII for the process schizophrenic group (SP), the reactive schizophrenic group (SR), the process psychiatric control group (CPP), the reactive psychiatric control group (CPR), as classified by the JR scale, and the normal control group (CN).

		PCI		PCII	
Groups	N	M	SD	M	SD
SP	16	11.63	2.63	14.06	3.28
SR	14	13.43	2.62	15.07	2.40
CPP	6	14.33	2.73	16.50	2.43
CPR	9	14.44	4.10	15.22	3.07
CN	15	14.80	2.73	16.47	2.07

ANOVA Source Table of PCI and PCII scores

Source	df	SS	MS	F	Prob.
Groups	4	139.48	34.87	2.41	ns
Error	55	797.35	14.50		
Treatments	1	78.96	78.96	59.95	$p < .001$
Interaction	4	8.65	2.16	1.64	ns
Error	55	72.44	1.32		

TABLE 9

Mean number of correct responses on Error Recognition, first (ERI) and second (ERII) administrations, and ANOVA source table of mean ERI and ERII for the process schizophrenic group (SP), the reactive schizophrenic group (SR), the process psychiatric control group (CPP), the reactive psychiatric control group (CPR), as classified by the JR scale, and the normal control group (CN).

		ERI		ERII	
Groups	N	M	SD	M	SD
SP	16	7.50	3.20	9.69	3.48
SR	14	9.57	3.03	11.14	3.98
CPP	6	11.00	2.76	13.50	2.95
CPR	9	11.11	4.34	12.56	3.54
CN	15	13.93	2.66	15.07	2.22

ANOVA Source Table of ERI and ERII scores

Source	df	SS	MS	F	Prob.
Groups	4	582.28	145.57	7.40	$p < .001$
Error	55	1081.39	19.66		
Treatments	1	81.61	81.61	56.35	$p < .001$
Interaction	4	6.64	1.66	1.15	ns
Error	55	79.66	1.45		

TABLE 10

Mean number of correct responses on Picture Completion, first (PCI) and second (PCII) administrations, and ANOVA source table of mean PCI and PCII for the process schizophrenic group (SP), the reactive schizophrenic group (SR), the process psychiatric control group (CPP), the reactive psychiatric control group (CPR), as classified by the UG scale, and the normal control group (CN).

		PCI		PCII	
Groups	N	M	SD	M	SD
SP	16	12.88	3.22	14.88	3.40
SR	11	12.27	2.24	14.18	2.56
CPP	5	13.80	2.05	15.80	2.49
CPR	10	14.70	4.11	15.70	3.09
CN	15	14.80	2.73	16.47	2.07

ANOVA Source Table of PCI and PCII scores

Source	df	SS	MS	F	Prob.
Groups	4	97.30	24.32	1.55	ns
Error	52	815.12	15.68		
Treatments	1	70.70	70.70	49.60	$p < .001$
Interaction	4	3.63	0.91	0.64	ns
Error	52	74.12	1.43		

TABLE 11

Mean number of correct responses on Error Recognition, first (ERI) and second (ERII) administrations, and ANOVA source table of mean ERI and ERII for the process schizophrenic group (SP), the reactive schizophrenic group (SR), the process psychiatric control group (CPP), the reactive psychiatric control group (CPR), as classified by the UG scale, and the normal control group (CN)

		ERI		ERII	
Groups	N	M	SD	M	SD
SP	16	8.50	2.94	10.44	3.18
SR	11	8.82	3.91	10.55	4.89
CPP	5	11.00	3.08	13.40	2.61
CPR	10	11.10	4.09	12.70	3.62
CN	15	13.93	2.66	15.07	2.22

ANOVA Source Table of ERI and ERII scores

Source	df	SS	MS	F	Prob.
Groups	4	482.87	120.72	5.71	$p < .002$
Error	52	1100.14	21.16		
Treatments	1	74.42	74.42	50.77	$p < .001$
Interaction	4	4.11	1.03	0.70	ns
Error	52	76.23	1.47		

Hallucination Inventory

The detailed results of the Inventory are reported in Appendix IX. The mean duration of hallucinations, in months, since their first appearance was 56, with a range of two months to 20 years. One patient started having hallucinations after a period of unusual hard work and another while in jail. All other 13 patients could not isolate any precipitating event or unusual circumstances surrounding the original occurrence of hallucinations.

Auditory hallucinations were present in all hallucinating patients followed by visual (67%), olfactory (47%), tactile (33%), and gustatory (13%). Half of the visual hallucinators also had experienced hallucinations in other sense modalities. There was, however, no evidence of fixed patterns or associations between hallucinations in any two specific modalities. The auditory hallucinations of all patients consisted mainly of voices. Only five patients reported that on rare and isolated occasions they had heard music or ill-defined sounds. For 13 of the 15 hallucinating patients, voices were heard particularly in the presence of background noise of low intensity such as noise coming from radiators, air conditioners, motors, radios, etc.

Visual hallucinations were seen clearly, were coloured and active as in normal life and were not distorted with respect to size, shape or form. The most commonly hallucinated objects were people which had been seen by all visual hallucinators. Animals were also reported by three and flashes of light by five. Hallucinations of tactile, olfactory and gustatory types were usually real, specific and recognizable and fitted no generalizable patterns. Voices were heard daily and clearly

by all patients, and all but three heard more than one voice. Every patient reported that voices talked directly to them and tried to influence their actions often suggesting violence or suicide. In every case, hallucinated voices were experienced as real and produced by tangible outside sources. Visual hallucinations were a daily occurrence in only five out of 10 patients. These daily visions were usually related to the voices. In all other cases hallucinations in modalities other than the auditory were infrequent, reported to have occurred with distinct chronological boundaries and were rarely associated with the simultaneous occurrence of multiple types of hallucinations.

Nine of the patients reported absolutely no control over the voices they heard whereas six were sometimes capable of decreasing their intensity. There was no relationship between relative control and diagnosis. Control over visual hallucinations was reported by four patients and was usually achieved by eye closure. The remaining six patients could in no way influence their visual hallucinations. The infrequency of the other hallucinatory types did not permit patients to judge their degree of control over their occurrence. Generally, patients found their hallucinations unpleasant and often frightening. In rare exceptions, hallucinations were experienced as enjoyable, notably when they were musical or generously sexual.

DISCUSSION

The main purpose of the present study was to investigate the effect of hallucinations on perceptual and cognitive tasks. No difference was found between the HS and the NHS groups on any of the measures used.

The classification of the schizophrenic group into process and reactive patients did not prove more useful in discriminating between subjects than the hallucinating-nonhallucinating subdivision. Again, there was no difference found on any of the measures used, between process and reactive schizophrenics.

Although the UG scale correlated significantly with the JR scale, the correlation accounted for only 40% of the variance. Examination of the content of each scale reveals major differences between them. The items of the UG scale probe for purely factual information such as marital status, education level, and work history. The JR scale, on the other hand, contains many questions regarding the qualitative and affective aspects of the subject's life, e.g. happiness in marriage, preference for solitude, feeling of being liked by others. Moreover, the JR scale contains four questions concerning the patient's past sexual behaviour whereas the UG scale does not even mention the subject. In view of the fact that both scales claim to be measures of outcome, and that outcome has been shown to be related more to the degree and quality of heterosexual relationship than to marriage per se, it is surprising to find no items pertaining to these content areas in the UG scale. It is even more surprising to

note that more researchers use the UG scale than the JR scale as a process-reactive self-report inventory (Bellissimo & Steffy, 1975; Kilburg & Siegel, 1973; Watson, 1976). Although the JR scale appears more discriminating than the UG scale, the fact that neither elicited differences between the process and the reactive schizophrenics supports the position that such methods of classification are of little value for reducing the heterogeneity of schizophrenic populations (Allon, 1972; Veilleux, Note 3).

Except for a significant difference in mean scores on the error recognition task and in intersubject variance on time estimation, no difference was observed on any of the remaining three measures between the schizophrenics as a group and the two control groups. The paucity of significant differences between all groups precludes any conclusions concerning the effect of hallucinations on psychological deficit in schizophrenia. If, in fact, the presence of hallucinations has positive or negative effects on the perceptual and cognitive processes of schizophrenic subjects, the dependent measures selected for use in this study were unable to elicit them. An examination of these measures appears appropriate at this point.

Pseudo-Isochromatic Plates (PIP)

It will be recalled that this test was chosen specifically because it had proved to be such a highly discriminating measure between schizophrenic and control groups. It is relevant to summarize the results of Bemporad's original study, which, according

to the author (Note 4) was never replicated. Bemporad tested three groups of schizophrenics, acute, chronic, and recovered, and one control group composed of non-schizophrenic psychiatric patients and organic patients. Most of the Subjects in all the groups identified the last number correctly which, as mentioned earlier, is very clearly outlined. Excluding this fourth card, the mean number of correct responses (for a possible total score of 3) on the other cards for his three schizophrenic groups combined and for the control group was 0.6 and 2.95 respectively. Such differences do not need statistical treatment to demonstrate their significance.

Why such discrepancy between the above findings and those of the present study? Sampling and treatment factors do not appear to account for this large difference; both samples included short-term and long-term patients, some of whom were severely disturbed, and most patients in both samples were receiving neuroleptic medication (Bemporad, Note 4). Although control for colour blindness appeared inadequate (Krill, 1977) and may explain part of the observed discrepancy between the two studies, it is unlikely to account for most of it. The fact that five out of 60 schizophrenic patients in Bemporad's study failed to recognize the number clearly outlined in card no. 4 suggests that other factors such as motivation, experimenter bias, degree and ease of communication, and experimenter-subject interactions were also at play. The main point remains that the failure of the present study to replicate Bemporad's findings adds to the already lengthy list of contradictions in the deficit literature without shedding any further light as to the probable cause of such inconsistencies.

Error recognition (ER) and Picture completion (PC)

As mentioned earlier, the only significant mean difference observed between the groups was on the ER test. The fact that no difference was found between the groups on the PC test suggests that although both tests measure visual discrimination of familiar objects (Wechsler, 1958) their structural difference is of importance in affecting results.

The two tests vary on the number of individual pictures contained in each item, ER presenting four and PC one. This would tend to make the former a more complex test in that it contains more information to be processed. This factor is taken into account in the formal procedure of the test administration in that Subjects are allotted half a minute more time for ER than for PC (Kellogg & Morton, 1957). The longer time period seems sufficient for the normal group to adapt to the greater demands of the test since they obtained comparable scores on both measures. It appears, however, that for the patient population, the increased complexity of ER could not be adequately overcome by additional time.

The fact that schizophrenics show deterioration in their performance with increased task complexity has often been reported (Buss & Lang, 1965; Hemsley, 1977; Hirt, Cuttler & Genshaft, 1977; Zimet & Fishman, 1970; Yates, 1966). The deterioration is even more marked when the stimuli have affective connotations for the patient (Buss & Lang, 1965; Deering, 1963). It is difficult to assess the affective impact of the ER test. However, several pictures which portray arms, cutting tools, a baby in its mother's arms and another baby alone in a wooden

tub drifting at sea may have elicited disruptive emotional responses in some Subjects. Most of the pictures of PC appear to be affectively neutral except for two which depict a gun and a pocket-knife. However, assuming that the affective impact of both tests is similar, the lesser amount of information contained in PC would still result in a decreasing number of possible alternative responses (Anderson, 1975), and consequently would reduce the probability of erroneous answers. This interpretation is supported by the fact that although the four stimuli in each item on ER are not designed to be interrelated, six schizophrenic Subjects, on the basis of their verbalizations, appeared to interpret them in this manner, particularly those items which portrayed people. This assumption often resulted in incorrect responses.

Even if the above mentioned variables contributed to the observed difference in performance between ER and PC, the major contributing factor probably resided in the validity of ER as a measure. The ER test of the Revised Beta Examination has often been criticized on the ground that it does not in fact measure what it purports to measure, e.g. "grasp of what is appropriate in familiar situations" (Schwartzman et al, 1962). The objections raised pertain to its ambiguity, its depiction of unfamiliar objects and its questionable "right" answers (Drake, 1949; Porteus, 1941). Many of the "right" answers seem to be more a reflection of cultural consensus than of objective, clearly identifiable errors. Porteus (1941) has stated that some items "are so unintelligible that they might qualify as tests of imagination, but

of nothing else". In this context, it would be similar to a projective test in which accuracy is defined by a norm rather than an objective right or wrong answer. The ER test then appears to measure degree of concordance with the norm. Any observed differences would reflect deviance in cognitive interpretation rather than a primary perceptual deficit.

It is tautological to say that a population grouped on the basis of behaviour disorders which are characterized by deviation from the norm should deviate from the norm in their interpretative responses (Bindra, 1959). The scores of normal individuals will, by definition, tend to fall within the range of normalcy whereas those of ab-normal individuals will be limited only by the possibilities of the task itself. If ER really constitutes a test of imagination, it is not surprising that the psychiatric samples were less successful than the normal group in the present study. Moreover, as schizophrenic patients are considered more deviant than non-schizophrenic psychiatric patients (Freedman et al, 1972), their interpretation of the test should have been more deviant than that of the latter group. This is, indeed, what was observed. The psychiatric control group performed significantly "worse" than the normal group but significantly "better" than the schizophrenic group. In other words, their judgment was closer to that of the normal Subjects than was the case for the schizophrenics.

PC, on the other hand, would not elicit such deviant responses because the stimuli are unambiguous, provide little opportunity for idiosyncratic interpretation, and depict clearly recognizable missing

features. Unlike a test of imagination and judgment, it specifically requires recognition of common objects. The similarity in performance between groups on PC is consistent with the findings of Johannsen and Testin (1966) who reported no difference between schizophrenics and normals on simple visual discrimination tasks and with Broen's (1968) view that ease of discrimination has an important effect on adequacy of performance in schizophrenia.

If the poorer performance of this particular psychiatric population on ER is attributable to their degree of general behavioral deviance, as opposed to specific perceptual deficit, one would expect that a less structured test, which permitted a larger range of answers, would elicit highly variable performance. The results observed on the time estimation task support this interpretation.

Time estimation

The variance of the schizophrenic group on the time estimation task was almost five times that of the normal group and twice that of the psychiatric control group. It is interesting to note that, once again, the psychiatric control group falls between the schizophrenic and normal groups. The large variability of time estimation in the schizophrenic group is consistent with previous findings (Dobson, 1954; Guertin & Rabin, 1960; Normington, 1967; Orme, 1962, 1966; Rabin, 1958; Warm et al, 1963).

It has been argued that time estimation does not involve perception so much as judgment (Bindra & Waksberg, 1956; Dobson, 1954; Gilliland, Hofeld & Eckstrand, 1946; Woodrow, 1951). The concept of time is

culturally acquired and varies from culture to culture (Barnouw, 1973; Carroll, 1956; Yaker & Franzblau, 1970). Although the exact cues used in time estimation are as yet unknown, a consciousness of "past" and "future" is necessary for a fair estimate of clock-time (Cott, 1969; Yaker & Franzblau, 1970). According to Gilliland et al (1946), the large variability observed in the time estimation of mescal and marijuana intoxicated individuals (estimates are sometimes abnormally short and sometimes abnormally long) is related to the "shortening of the field of consciousness" resulting in a "sort of contemplation of the present instant which lacks a frame of reference" (p. 165). Time estimation then becomes distorted when the sense of reality is disturbed and it is strongly influenced by the presence or absence of purpose for, according to Oberndorf (1941), without purpose, the value of time greatly diminishes.

It has long been recognized that most schizophrenics suffer from a disturbed sense of reality (Freedman et al, 1972). The lack of time-bound activities in the daily existence of most hospitalized patients accentuates the importance of subjective mental processes, deviant or normal. Like the mescal intoxicated individuals, many psychiatric patients, and for that matter, many long-term hospitalized organic patients, can be thought of as being in a state of "contemplation of the present instant" in which the idea of past and future becomes lost in a sea of monotony. Depending on the content of their internal processes at the time of testing, time could seem very short or very long, or even irrelevant. In this sense, their reported time estimates

could be random, or the consequence of altered judgment but whatever the specific underlying factor, the overall results would be large variations between and probably within Subjects when tested at various intervals. This variation would not necessarily be an effect of their "disorder" but of their living conditions.

The results of the experimental aspect of the present study indicated that on tests which reflect subjective judgment, psychiatric patients, particularly those diagnosed schizophrenic, exhibit greater intra-group variations than a normal population. There is, however, no basis for interpreting variability as synonymous with deficit.

Similarly, as will be discussed presently, there is no empirical evidence justifying the common association between reports of hallucinations and a diagnosis of schizophrenia. The hallucinatory experience reported by hallucinating schizophrenics in the present study was remarkably typical of the phenomenological literature describing hallucinations in schizophrenia. Most particularly, accounts of the following characteristics were all consistent with previous reports discussed earlier (see introduction): 1) incidence rate in specific modalities, 2) content, 3) patterns of occurrence over long periods of time (e.g. months and years), 4) the reactions of the patients to their hallucinations. In fact, the hallucinatory experiences reported by the Subjects in the present study are in no way contradictory to any other study known to this author, on this particular subject. Hence, it seems reasonable to conclude that this specific group of patients represents a reliable sample of hallucinating schizophrenics,

and that the present findings offer no new insight nor discrepancy with respect to the above features. This investigation, however, did uncover certain characteristics which have been neglected by most reports concerned with the hallucinations of schizophrenics, and which may shed some light on this intriguing phenomenon.

The most interesting finding emerging from the Hallucination Inventory data is the synchronous occurrence of auditory hallucinations and low intensity background noise. As may be recalled, 13 (87%) hallucinating schizophrenics reported that their auditory hallucinations seemed to originate from a noise source like a radiator, an air conditioner, a running motor or a radio. Although there have been isolated reports of such events mentioned in the writings of schizophrenics (Lang, 1938; Pfeifer, 1970), the only published study investigating the effects of background noise on auditory hallucinations in schizophrenia was conducted in Russia by Vertogradova and Rubinstein (1969). Presenting recorded noises of various kinds at near threshold levels to 40 verbally hallucinating schizophrenics, the authors found that this particular kind of environmental stimulation "plays an important role in producing auditory hallucinations" (Zusne, 1969). This seems to indicate that hallucinations in schizophrenia are distortions of environmental sounds the identity of which would be ambiguous due to their low intensity level. In fact, Slade (1972, 1974), Lapidus and Schmolling (1975), and West (1975) reported that hallucinations are especially vivid and emotionally charged when external stimulation is not only reduced but also when levels of arousal are high. The assumption that a hyperaroused

state is a necessary condition for the distortion of auditory stimulations is further supported by Slade (1972, 1973). He reported that a significant decrease in auditory hallucinations correlated with a general decrease in "internal arousal" and a lowering of external stimulation. This suggests that low stimulation will serve to enhance the presence of a disturbing symptom only when the Subject is already in a hyperaroused state. Zahn, Rosenthal and Lawlor (1968) reported that in patients characterized by a high level of arousal, the weaker the stimuli, the greater the autonomic responsivity. This apparent reversal of the relationship between the magnitude of the effect and the intensity of excitation is not a new finding; it was observed by Pavlov (1930) in his experiments with dogs.

Patient No. 3 who had been hearing voices for ten years and who was the first to volunteer the information that they always originated from some source of undefined sound, described their occurrence as follows: "I know when I'm going to hear voices because it starts with a pressure in my head which gets higher and higher. My eyes get blurred, and I cannot focus. I become very restless and I feel like my pupils are turning in my head. Then the voices come and all the time that I hear them, the pressure in my head is very very high". This clinical description does indeed indicate a very high level of arousal in this patient prior to and during her hallucinations. This is consistent with the report that increased emotional arousal will frequently produce an hallucinatory exacerbation in hallucinating schizophrenics (Alpert & Silvers, 1970; Cowen, 1970).

Reports of an association between hyperarousal and hallucinations in normal individuals point to the universality of this particular pattern. Perceptual isolation or sensory deprivation (SD) experiments often induce hallucinations in some normal people (Bexton, Heron & Scott, 1954; Heron, Doane & Scott, 1956; Mendelson, Solomon & Lindemann, 1958; Silverman, Cohen, Bressler & Shmavonian, 1962; Vernon & McGill, 1957, 1962; Zuckerman, 1970). Although these hallucinations are usually visual and somesthetic, auditory hallucinations have also been known to occur (Freedman, Grunebaum, Stare & Greenblatt, 1962; Shurley, 1960, 1962; Silverman et al, 1962). The experience of SD itself has often been described as stressful by the Subjects (Bexton et al, 1954; Heron et al, 1956; Mendelson et al, 1958; Reitman & Cleveland, 1964; Silverman et al, 1962); and anxiety, measured as a psychophysiological state (GSR) was found to be higher in normal Subjects who reported hallucinations during SD than in those who did not (Cohen, Silverman & Shmavonian, 1962; Zuckerman & Hopkins, 1966). Although it was noted in the original experiment of Bexton et al (1954) that the plastic shield covering the eyes of the subjects admitted light but prevented pattern vision, the first study investigating the effect of level of stimulation was done by Vernon and McGill (1957). They found that hallucinations did not occur in conditions of confinement allowing for either pattern vision or "no light stimulation of any sort" (Vernon & McGill, 1962, p. 150). The only condition which produced hallucinations was that of low intensity stimulation which did not permit pattern or form discrimination.

A case report by Goldstein (1976) corroborates the above findings. The author, an experimental psychologist, experienced hallucinations typical of those reported by hallucinating schizophrenics for three days following a long period of anxiety and sleeplessness, anticipating a painful surgical procedure. Goldstein "saw" his visions reflected on the glossy surface of his room door which opened onto the ward corridor, or in the semi-darkness of his room; his voices were "heard" originating from an air-vent adjacent to his room.

Although the effect of level of stimulation during SD on established hallucinations in schizophrenics has not yet been investigated, there is evidence to suggest that varying degrees of stimulation have a different influence on such hallucinations. For example, Harris (1959) reported a decrease and even, in some patients, a cessation of hallucinations while in the SD situation, whereas Smith, Thakurdas and Lawes (1961) observed no change in their number, type or intensity. However, the two studies differed in important methodological aspects. The isolation chamber used by Harris (1959) was soundproof whereas the one of Smith et al (1961) had a low level of "sound pressure". Moreover, in the first study, the Subjects wore opaque goggles, while the degree of visual stimulation was not disclosed by the authors of the second study.

All of these reports indicate that hallucinations occurring in the waking state are not simply the effect of a disordered brain, but constitute distortions of environmental stimulation occurring under particular autonomic states (Fisher, 1972; Goldstein, 1976). The more

ambiguous the stimuli, and the higher the state of perceptual uncertainty and confusion, the more likely the hallucinations (Hartmann, 1975; Hebb, 1966). In this context, it is interesting to note that on a dichotic listening task of well integrated sentences and poorly integrated sentences, hallucinating schizophrenics were reliably deficient when compared to normals only on the poorly integrated sentences (Alpert, Rubinstein & Kesselman, 1976). This, once again, suggests that distortions are not related to the number of stimuli but to their relative decipherability. Although reactions to hyperaroused states will differ from person to person, and not everyone with the same level of arousal (produced by equated dosages of LSD or psilocybin per body weight) will experience hallucinations (Fisher, 1970, 1972), it appears that the experience of hallucinations necessitates a hyperaroused state (Fisher, 1972; Hebb, 1966). Hyperarousal is not to be confused with overt behavioural hyperreactivity. In fact, one of the most extreme states of hyporeactivity, catatonic stupor, is reported to occur only under extremely high levels of arousal as a protective inhibitory mechanism (Fisher, 1972). Writings by schizophrenics (Kaplan, 1964; Pfeifer, 1970) and reports from three hallucinating schizophrenics in this study, who recalled periods of catatonia sometimes lasting for up to nine months, give support to this interpretation.

The association of hyperarousal with confusing sensory stimulation for the production of hallucinations has led authors to advance possible explanations for the higher incidence of hallucinations in the auditory modality than in other sense modalities in schizophrenia.

According to Feinberg (1962), environmental auditory stimulation is more fleeting and transitory than visual stimulation where prolonged exposure to the same stimuli is common. As the auditory background is less structured, it is therefore more ambiguous and open to misinterpretation and reconstruction. If hallucinations in schizophrenia are to be considered secondary to the disorder and subject to the same laws as hallucinations in normal individuals (Bertalanffy, 1966; Fisher, 1970, 1972, 1975; Forrer, 1970; Harris, 1970; Schilder, 1933; Segal, 1970; Smith, 1935) it follows that normal hallucinators should also be more prone to auditory than to visual hallucinations. This is rarely the case. However, it has been reported that visual experiences characterize the incipient stages of schizophrenia and are similar to those induced by LSD and mescaline; auditory hallucinations apparently only become prevalent after the hallucinatory process has lasted for some weeks or months (Weil-Malherbe, 1967). Moreover, Small et al (1966) found that in many hallucinators, the hallucinations existed for a "long time" prior to psychotic breakdown. Investigation of the early stages of psychosis is very difficult because most psychotics come to the attention of clinicians, and consequently of researchers, only when their coping mechanisms, or those of their guardians or friends, have failed. According to Fisher (1972), it is the chronicity of the schizophrenic process, as contrasted with the acuteness of the drug-induced state, which may account for the differences between auditory and visual hallucinations. This is consistent with the previously mentioned finding that auditory hallucinations are

the most typical in chronic abuse of certain drugs (Fisher, 1972; Harrison, 1974; Levin, 1960; Smith, 1935; Victor & Hope, 1963).

The persistence of the schizophrenics' hallucinations over time may also contribute to the widely divergent interpretations elaborated by hallucinating schizophrenics as compared to hallucinating normals. It is one thing to hear one's name called once in a while and realize that nobody was there to utter it, it is another to be "invaded" by voices for days and weeks on end without any apparent explanatory cause or control over their occurrence. There have, however, been reports of recurring voices and visions in normals (Fisher, 1972; Gordon, 1941) which did not lead to psychotic breakdown. These persons used them creatively or simply learned to live with them. Visual hallucinations were apparently common in the lives of people like Luther, Pascal and Goethe, and auditory hallucinations pursued others like Joan of Arc, William Blake, Descartes and Schumann, to name but a few (Medlicott, 1958). According to Menninger (1949) 10 per cent of students in one of his classes claimed to have experienced hallucinations on more than one occasion. Fisher (1975) has pointed out that the interpretation given to hallucinations may be creative or pathological; the pathological interpretations are more often reported because psychiatrists see hallucinating mental patients, not hallucinating creators.

According to a number of writers (Fisher, 1975; Forrer, 1970; Hartmann, 1975; Savage, 1975; Schilder, 1933; Segal, 1970; Smith, 1935) the only difference between the hallucinations of schizophrenics and those of normals resides specifically in this dissimilar meaning or

interpretation which is ascribed to them. Vermeylen (1934) also suggested that it is not the presence of the hallucinations which is indicative of pathology but the strangeness of the interpretative process. According to Clérambault (1934) the hallucinated voices and visions constitute, in the incipient stage of psychosis, a "personalité parasitaire" (parasitic personality) which presages the cognitive structure of the patient's thoughts in the later phase of the illness ("elle représente la forme mentale qui sera, dans plusieurs années, celle du malade", p. 436). It would indeed be very interesting to test such an hypothesis in a longitudinal study of acute hallucinating schizophrenics. It might prove a reliable measure of the level of personality disintegration in the early phase of psychosis.

Although the belief in the physical reality of hallucinations entertained by schizophrenics is a commonly reported phenomenon, and constituted, in fact, one of the inclusion criteria for hallucinating schizophrenics in the present study, the belief in the "universality of hallucinations" has not been investigated since Dretler (1934) reported it as a common symptom of psychosis. Five patients in this study spontaneously mentioned such a conviction and an additional five expressed doubts as to their non-universality. "I hear voices all the time, everyone hears voices, that's the way things are. ... I didn't hear them before because I was too young. You start hearing them when you come of age" (Patient No. 12). "Life is a stepping stone to another world, it's just a game. The voices and the visions are just one of the games although a very dangerous one! The devil uses everyone but not everyone knows it. Those who deny hearing him are just lying"

(Patient No. 10). "In some places, there are more voices than in others and everyone can hear them. I don't know why but the hospital is full of voices" (Patient No. 5). "I told my sister about my voices and I asked her to tell me about hers. She told me she didn't hear any so I stopped talking to her. I know she was lying, like all the people here (in the hospital) because it's obvious that everyone must hear them" (Patient No. 9). Patient No. 2 was so convinced of the universality of her voices that she was hospitalized three times "because I was depressed" for a few months each time, before she mentioned them to her psychiatrist. She thought that whoever asked her questions concerning voices had to be laughing at her since they could hear them as well as she.

The conviction of the universality of hallucinations goes hand in hand with the belief in their external reality. Patients often mention their feelings of despair at acknowledging that their voices are not ubiquitous. "Where then do they come from, and why me?" Delusions often spring from the attempt to answer this question (Forrer, 1970). According to Linn (1977) the extent of efforts to find a plausible cause is an index of how real the hallucinations feel to the hallucinating person. Patient No. 1 who reported a multitude of screaming voices which fought with each other, thought that she had become a "radio-slut" and that she was being used by all "these people" as a "broadcasting system" for their warfare communications. Interestingly enough, she concluded that if she developed a strong internal voice of her own, "they" would not be able to go on doing this to her. Patient

No. 13, who similarly heard fifty to sixty people arguing and battling in her head concentrated on one of the voices who became the leader and provided her with some relief by arguing with the other malevolent voices on her behalf. "As long as he is in control, it doesn't make me feel so bad". Three religiously reared men attributed their "bad" voices to the devil and their "good" voices to God. Actually, most patients reported hearing some "good" voices even though they still would have preferred to get rid of them. "I sometimes enjoy my voices when they are not too loud and when they talk nicely, but what is it worth to me if I cannot live a normal life?" (Patient No. 1). Insight sometimes occurred in strange ways: "I have been hearing voices for two years, and I always thought that they were real voices, coming from outside of me. Last week, one of my voices was crying while I was crying. Now I'm not too sure if that was not my own voice I was hearing" (Patient No. 11).

If the occurrence of hallucinations is not in itself indicative of pathology, it follows that their presence concomitant with a pathological state should not be interpreted as a symptom of the illness (Fisher, 1972, 1975; Kubie, 1972). This point was particularly well illustrated in the writings of an ex-patient. After telling her therapist that she had "contaminated" her sister and given her her own illness, the therapist asked: "Do you make her have hallucinations or smell things that are not there?" She answered: "No, the illness is not seeing or hearing things - the illness is underneath those. I never gave her symptoms. The illness is the volcano; she will have to decorate

the slopes herself" (Greenberg, 1964, p. 83).

It would appear that most investigations, including the present one, have been concerned with measuring the "decorations" instead of concentrating on the "volcano". The decorations constitute the subjective constructions or, in Fisher's words the "representation of the symbolic interpretation of an individual's CNS activity" (1972, p. 115). These interpretations are not "caused" by the illness but are related to the subject's total past and interaction with the environment. They undoubtedly have relevance in the therapeutic process, but they are bound to lead to a dead-end in research concerned with the etiology of certain forms of psychosis since it is crucial, in such research, to differentiate between the "sickness" and the "sick life" (Kubie, 1972).

What then is the "sickness" in schizophrenia? The observation that schizophrenic patients are a heterogeneous lot characterized by idiosyncratic and deviant associations is common (Broen, 1968; Buss & Lang, 1965; Fisher, 1972; Garmezy & Rodnick, 1970; Kubie, 1972). Yet, idiosyncratic associations are not peculiar to mental disorders. The associations of artists and great scientists are often highly idiosyncratic (Arieti, 1976; Jackson & Messick, 1968; MacKinnon, 1966). However, whereas the creative individual is free to travel between the "normal" and the creative (hyperaroused) state, the schizophrenic appears stranded in a "jammed computer" state (Fisher, 1975).

The incapacity of the schizophrenic individual to "ease up" (Smith, 1935) still remains one of the most important and common aspect

of the disorder (West, 1975). Natural experiences, like hallucinations, which in health are quickly repressed in the normal course of life become, in the schizophrenic, "subjected to elaborations and frequently escalated to the status of delusions" (Forrer, 1970, p. 462). Once again, it seems that it is not the particular experiences of the schizophrenic which markedly differ from normals but rather, the constructed elaborations and judgment of these experiences.

According to Bibring (1937) there is an inherent "gradient" in all humans toward approximating the requirements of reality and toward "valuing what is expedient". An impairment of the "slope of this gradient" is shifted in practically all behaviour disorders to a greater or lesser degree, from depression (Lindemann, 1944) to psychosis (Freedman et al, 1972). This "shift" is apparently most marked in "paranoid" personalities who, as Cameron (1959) pointed out, do not have the capacity to assume the role of other persons and adopt a detached and objective view either of the self or of others. "Healthy" individuals, on the other hand, will check confusing experiences and make connections in their relationships with the environment when these seem appropriate (Redlich & Freedman, 1966).

The capacity for "objective evaluation and judgment of the external world" is referred to as "reality testing" (Chaplin, 1973). It is said to rely on the discriminative functions or the proper use of intelligence without interference from drives and affects (Redlich & Freedman, 1966). As the concept originated in psychoanalytic theories, relative adequacy of reality testing is believed to result

from learning in the early stage of life. However, it is likely that genetic predispositions and their interaction with the environment also contribute to the proper development and functioning of this inherent "gradient".

Whereas creative individuals seem to be experts at testing the reality of their highly original associations and interpretations, the schizophrenics appear hampered in their capacity to reflect upon the content of some of their thoughts in a culturally valid way, and to judge their appropriateness as guidelines for action. In other words, schizophrenics are limited in their capacity for reality testing for reasons that have not as yet been determined.

This limitation in the appropriate assessment of reality is probably at the basis of many reported deficits in psychological functions. As Brown (1973) pointed out, these observed "deficits" have been generally interpreted as involving an over-all, "content-free impairment of a basic function like perception, learning, concept formation, or attention" (p. 402). Observations and experimental results, according to Brown (1973) tend to show that disruptions occur, in many functions concomitantly, only when some aspect of the stimulus approaches the disturbed content area of each particular patient. For example, in investigating whether the mechanisms involved in selective attention were dysfunctional in schizophrenia, Schneider (1976) found that only dichotic shadowing of personalized delusional distractions impaired the delusional schizophrenic group, whereas the loudness of the distraction did not affect schizophrenics

differently from nonschizophrenics.

The search for a particular focus of deficiency has made many researchers ignore the forest to concentrate on some of the trees. "The average laboratory task, possibly any laboratory task, may elicit a lower performance from schizophrenics than from normals because it here and there touches on something that matters to one or another subject, and this will happen a bit more often and will be more disruptive for schizophrenics than for normals" (Brown, 1973, p. 402). Brown's assumption that normals would also be affected, albeit less, in a similar situation is supported by the work of Moray (1959) which suggests that when distraction is personalized for normals, the distraction affects the performance of the normal subjects.

Although a relative disruption of the capacity for adequate reality testing is likely to be present in most forms of pathological cognition, from the most benign neurosis to the most chronic psychosis (Freedman et al, 1972), the outward expression of the cognitive process will often assume different forms in different individuals, or will assume the same form even though the underlying disorder may be etiologically very different (Kubie, 1972). For instance, psychotic-like reactions, which could not be differentiated clinically from schizophrenia, have been reported in combat fliers under the stress of battle (Grinker & Spiegel, 1945) and in drug-induced psychosis (Beamish & Kiloh, 1960; Bell, 1965). This point was well stressed by an ex-schizophrenic who spent ten months in a mental hospital and who later became a psychiatric nurse: "During my years as a psychiatric nurse I have realized that I

am not likely ever to know if my problems are shared by other schizophrenics or not, for the acutely ill are as much of a puzzle to me as they are to staff who have never known the illness. ... I have almost reached the conclusion that there is no common meeting ground for schizophrenics, whether acutely ill or recovered. Schizophrenia seems to consist of explorations in fathomless worlds of unreality, sometimes controlled and channelled into creative thought" (MacDonald, 1964, pp. 178-179).

If, as mentioned earlier, adequate reality testing consists of the objective evaluation and judgment of the world outside of the self and provides the person with a mechanism for handling both the external world and his or her own internal excitation (Hinsie & Campbell, 1974) the "volcano" feeling of the schizophrenic could result from a "short-circuiting" of this particular mechanism. In the same way that an electrical short-circuit can vary in intensity and produce any level of disruption from simple static in, for example, a radio to a complete burning of the wires, such "short-circuiting" intensity will also vary in an individual. "Spontaneous remission" might simply be the result of auto-repair in the organism under favourable constitutional and environmental conditions while progressive deteriorations would imply a gradual burning-out of the whole "wiring system". In this context, it is not surprising that chronic schizophrenics are sometimes referred to as "burned-out" (Cowen, 1970).

The reality testing interpretation could account for the fact that psychotic breakdown does not usually occur before late adolescence

or early adulthood (Freedman et al, 1972; Salzinger, 1973). There is less developmental and social pressure to test reality before one reaches an age when it is assumed that important responsibilities can and should be taken. As mentioned earlier, it is not likely that phenomenological investigations of "symptoms" will bring us closer to the etiological source of the disorder because of the large heterogeneity of samples diagnosed "schizophrenic". Nevertheless, it remains important that such studies be carried out if only to clarify some unwarranted assumptions, and occasional outright prejudices concerning certain states of being often labeled "schizophrenia" (Fisher, 1972; Kubie, 1972).

A previous study (Veilleux & Melzack, 1976) challenged the commonly held belief that complaints of pain by psychotic patients, in the absence of known organic disease, reflect a purely hallucinatory phenomenon. It was found that the reported sensory dimensions of their pain were the same as those of organic patients, suggesting that they were genuinely in pain. The affective dimensions, however, were much more elaborate in psychotic than in organic patients. Similarly, the results of the present study support the view that reported hallucinations in "schizophrenia" are not unique or central to the disorder, but rather that they follow the same perceptual laws as hallucinations in normal people. It is, therefore, suggested that the main difference between the "schizophrenic" and the "normal" individual resides in a faulty mechanism for interpreting sensory phenomena, not in the actual nature of such phenomena.

REFERENCE NOTES

1. Mednick, S.A. Berkson's fallacy and high risk research. Paper presented at the Second Rochester International Conference on Schizophrenia, Rochester, May 1976.

2. Hebb, D.O. Personal communication, January 27, 1976.

3. Veilleux, S. The process-reactive method of classification in schizophrenia. Unpublished manuscript, Concordia University, 1976.

4. Bemporad, J.R. Personal telephone communication, March 10, 1977.

REFERENCES

1. Allon, R. On measurement of process-reactive schizophrenia. In A.R. Kaplan (Ed.), Genetic factors in "schizophrenia". Springfield, Ill.: Charles C. Thomas, 1972.
2. Alpert, M., Rubinstein, H., & Kesselman, M. Asymmetry of information processing in hallucinators and non-hallucinators. Journal of Nervous and Mental Disease, 1976, 162, 258-265.
3. Alpert, M., & Silvers, K.N. Perceptual characteristics distinguishing auditory hallucinations in schizophrenia and acute alcoholic psychoses. American Journal of Psychiatry, 1970, 127, 298-302.
4. Anderson, B.F. Cognitive psychology, The study of knowing, learning, and thinking. New York: Academic Press, 1975.
5. Arieti, S. Creativity, the magic synthesis. New York: Basic Books Inc., 1976.
6. Ash, P. Reliability of psychiatric diagnosis. Journal of Abnormal and Social Psychology, 1949, 44, 272-277.
7. Atwell, C.R., & Wells, F.L. Wide range mutiple-choice vocabulary tests. Journal of Applied Psychology, 1937, 21, 550-555.
8. Atwell, C.R., & Wells, F.L., Manual and keys for Wide range vocabulary tests. New York: The Psychological Corporation.
9. Ban, T.A. Recent advances in the biology of schizophrenia. Springfield, Ill.: Thomas, 1973.
10. Barnouw, V. Culture and personality. Homewood, Ill.: The Dorsey Press, 1973.

11. Beamish, P., & Kiloh, L.G. Psychosis due to amphetamine consumption. Journal of Mental Sciences, 1960, 106, 337-343.

12. Becker, W.C. The relation of severity of thinking disorder to the process-reactive concept of schizophrenia (Doctoral dissertation, Stanford University, 1955). Dissertation Abstracts International, 1955, 15. Nos. 8-10, 1894. (University Microfilms No. 13,255).

13. Bell, D.S. Comparison of amphetamine psychosis and schizophrenia. British Journal of Psychiatry, 1965, 111, 701-707.

14. Bellak, L. Dementia Praecox. New York: Grune and Stratton, 1948.

15. Bellissimo, A. & Steffy, R.A. Contextual influences on crossover in the reaction time performance of schizophrenics. Journal of Abnormal Psychology, 1975, 84, 210-220.

16. Bemporad, J.R. Perceptual disorders in schizophrenia. American Journal of Psychiatry, 1967, 123, 971-976.

17. Bertalanffy, L. von. General system theory and psychiatry. In S. Arieti (Ed.), American handbook of psychiatry (vol. 3). New York: Basic Books Inc., 1966.

18. Bexton, W.H., Heron, W., & Scott, T.H. Effects of decreased variation in the sensory environment. Canadian Journal of Psychology, 1954, 109, 70-76.

19. Bibring, E. Symposium on the theory of therapeutic results of psychoanalysis. International Journal of Psycho-analysis, 1937, 18, 170-189.

20. Bindra, D. Experimental psychology and the problem of behaviour

disorders. Canadian Journal of Psychology, 1959, 13, 135-150.

21. Bindra, D., & Waksberg, H. Methods and terminology in studies of time estimation. Psychological Bulletin, 1956, 53, 155-159.

22. Bleuler, E. The physiogenic and psychogenic in schizophrenia. American Journal of Psychiatry, 1930, 10, 203-211.

23. Bleuler, E. Textbook of psychiatry. New York: Macmillan, 1936.

24. Bleuler, M. Klinik der schizophrenen Geistesstörungen. In Psychiatre der Gegenwart (vol. 2). Heidelberg: Springer, 1972. Cited in World Health Organization. Schizophrenia: A multinational study. Public Health Papers No. 63. Geneva: WHO, 1975, p. 34.

25. Broadhurst, A. Experimental studies of the mental speed of schizophrenics. Journal of Mental Sciences, 1958, 104, 1130-1135.

26. Broadhurst, A. Time estimation related to personality, cognitive speed and schizophrenia. Life Sciences, 1969, 8 (part 2), 69-78.

27. Broen, W.E. (Jr.). Schizophrenia, research and theory. New York: Academic Press, 1968.

28. Brown, R. Schizophrenia, language and reality. American Psychologist, 1973, 28, 395-403.

29. Buss, A.H., & Lang, P.J. Psychological deficit in schizophrenia: I. Affect, reinforcement and concept attainment. II. Interference and activation. Journal of Abnormal Psychology, 1965, 70, 2-24, 77-106.

30. Cameron, N. The paranoid pseudo community revisited. American Journal of Sociology, 1959, 65, 52-62.

31. Carroll, J.B., (Ed.). Language, thought and reality. Selected writings of Benjamin Lee Whorf. Boston: Technology Press of Massachusetts, Institute of Technology, 1956.

32. Caston, J. Completion effects and attention in hallucinatory and nonhallucinatory patients and normal subjects. Journal of Nervous and Mental Disease, 1969, 148, 147-157.

33. Chaplin, J.P. Dictionary of psychology. New York: Dell Publishing Co. Inc., 1973.

34. Clérambault, G. de. "Comment", in G. Vermeylen. Hallucinations et niveau mental. Annales médico-psychologiques, 1934, 92 (2), 429-440.

35. Clouston, T.S. Clinical lectures on mental diseases. Philadelphia: H.C. Lea's Son & Co., 1884.

36. Cohen, S.I., Silverman, A.J., & Shmavonian, B.M. Psychophysiological studies in altered sensory environments. Journal of Psychosomatic Research, 1962, 6, 259-281.

37. Cott, A. The metronome as a measuring device in the study of disorders of "time flow" in schizophrenia. Schizophrenia, 1969, 3, 148-160.

38. Cowen, M.A. The pathophysiology of schizophrenic hallucinosis. In W. Keup (Ed.), Origins and mechanisms of hallucination. New York: Plenum Press, 1970.

39. Craig, R.J. Relationships between severity of illness and

overinclusive thinking in schizophrenia. Psychological Reports, 1970, 26, 251-254.

40. Crumpton, E. Persistence of maladaptive responses in schizophrenics. Journal of Abnormal and Social Psychology, 1963, 66, 615-618.

41. Deering, G. Affective stimuli and disturbance of thought processes. Journal of Consulting Psychology, 1963, 27, 338-343.

42. Dobson, W.R. An investigation of various factors involved in time perception as manifested by different nosological groups. Journal of General Psychology, 1954, 50, 277-298.

43. Drake, R.M. Revised Beta Examination. In O.K. Buros (Ed.), The third mental measurement yearbook, New Brunswick: Rutgers University Press, 1949, No. 259.

44. Dretler, J. Des relations entre la croyance de l'halluciné et sa conviction de l'universalité des hallucinations. L'Encéphale, 1934, 29, 381-395.

45. Eysenck, S.B., & Eysenck, H.J. The personality of female prisoners. British Journal of Psychiatry, 1973, 122, 693-698.

46. Feinberg, I. A comparison of the visual hallucinations in schizophrenia with those induced by mescaline and LSD-25. In L.J. West (Ed.), Hallucinations. New York: Grune & Stratton, 1962.

47. Fisher, R. Prediction and measurement of perceptual-behavioral change in drug-induced hallucinations. In W. Keup (Ed.), 1970, op.cit.

48. Fisher, R. Schizophrenia research in biological perspective.

In A. R. Kaplan (Ed.) 1972, op.cit.

49. Fisher, R. Cartography of inner space. In R.K. Siegel & L.J. West (Eds.), 1975, op. cit.

50. Forgus, R., & DeWolfe, A.S. Perceptual selectivity in hallucinatory schizophrenics. Journal of Abnormal Psychology, 1969, 74, 288-292.

51. Forrer, G.R. The function of hallucinated pain. In W. Keup (Ed.), 1970, op. cit.

52. Freedman, B. & Chapman, L.J. Early subjective experience in schizophrenic episodes. Journal of Abnormal Psychology, 1973, 82, 46-55.

53. Freedman, A.M., Kaplan, H.I., & Sadock, B.J. Modern synopsis of comprehensive textbook of psychiatry. Baltimore: The Williams & Wilkins Co., 1972.

54. Freedman, S.J., Grunebaum, H.U., Stare, F.A., & Greenblatt, M. Imagery in sensory deprivation. In L.J. West (Ed.), 1962, op. cit.

55. Garmezy, N., & Rodnick, E.H. Premorbid adjustment and performance in schizophrenia. In W.S. Sahakian (Ed.), Psychopathology Today. Itaska, Ill.: F.E. Peacock Publishers Inc., 1970.

56. Gilliland, A.R., Hofeld, J. & Eckstrand, G. Studies in time perception. Psychological Bulletin, 1946, 43, 162-173.

57. Goldstein, A.G. Hallucinatory experience: A personal account. Journal of Abnormal Psychology, 1976, 85, 423-429.

58. Goldstein, R.H. & Salzman, L.F. Proverb word counts as a measure of overinclusiveness in delusional schizophrenics. Journal of Abnormal Psychology, 1965, 70, 244-245.

59. Goodwin, D.W., Alderson, P., & Rosenthal, R. Clinical significance of hallucinations in psychiatric disorders. Archives of General Psychiatry, 1971, 24, 76-80.

60. Gordon, A. Hallucinosis as a clinical entity and its interpretation. Journal of Nervous and Mental Disease, 1941, 94, 732-739.

61. Greenberg, J. I never promised you a rose garden, New York: Signet, 1964.

62. Grinker, R.R., & Spiegel, J.P. Men under stress. Philadelphia: Blakiston, 1945.

63. Guertin, W.H., & Rabin, A.I. Misperception of time in schizophrenia. Psychological Reports, 1960, 7, 57-58.

64. Hall, K., & Crookes, M., Studies in learning impairment. I: Schizophrenic and organic patients. Journal of Mental Sciences, 1951, 97, 725-737.

65. Harris, A. Sensory deprivation and schizophrenia. Journal of Mental Sciences, 1959, 105, 235-237.

66. Harris, J. Toward a structural theory of hallucinations. In W. Keup (Ed.), 1970, op. cit.

67. Harrison, T.R. Principles of internal medicine (7th edition). New York: McGraw-Hill Book Co., 1974.

68. Hartman, E. Dreams and other hallucinations: an approach to the underlying mechanism. In R.K. Siegel & L.J. West, (Eds.), 1975, op. cit.

69. Hebb, D.O. A textbook of psychology. Philadelphia: W.B. Saunders, Co., 1966.

70. Hemsley, D.R. What have cognitive deficits to do with schizophrenics symptoms? British Journal of Psychiatry, 1977, 130, 167-173.

71. Heron, W., Doane, B.K., & Scott, T.H. Visual disturbances after prolonged perceptual isolation. Canadian Journal of Psychology, 1956, 10, 13-18.

72. Higgins, J. Process-reactive schizophrenia. Journal of Nervous and Mental Disease, 1969, 149, 450-472.

73. Higgins, J., & Mednick, S.A. Reminiscence and stage of illness in schizophrenia. Journal of Abnormal and Social Psychology, 1963, 66, 314-317.

74. Hill, J.M. Hallucinations in psychoses. Journal of Nervous and Mental Disease, 1936, 83, 405-421.

75. Hinsie, L.E., & Campbell, R.J. Psychiatric Dictionary (4th Ed.) London: Oxford University Press, 1974.

76. Hirt, M., Cuttler, M., & Genshaft, J. Information processing by schizophrenics when task complexity increases. Journal of Abnormal Psychology, 1977, 86, 256-260.

77. Hollender, M.H., & Boszormenyi-Nagy, I. Hallucinations and ego experience. A.M.A. Archives of Neurological Psychiatry, 1958, 80, 93-97.

78. Horowitz, M.J. Hallucinations: an information-processing approach. In R.K. Siegel, & L.J. West (Eds.), 1975, op. cit.

79. Horowitz, M.J., & Adams, J.E. Hallucination on brain stimulation: evidence for revision of the Penfield hypothesis. In W. Keup

(Ed.), 1970, op. cit.

80. Hunt, J. McV., & Cofer, C.N. Psychological deficit. In J. McV. Hunt (Ed.), Personality and the behavior disorders. New York: Ronald Press, 1944.

81. Huston, P.E., & Shakow, D. Learning in schizophrenia: I. Pursuit learning. Journal of Personality, 1948, 17, 52-74.

82. Huston, P.E., & Shakow, D. Learning capacity in schizophrenia with special reference to the concept of deterioration. American Journal of Psychiatry, 1949, 105, 881-888.

83. Itil, T.M. Changes in digitized computer analyzed EEG during "dreams" and experimentally induced hallucinations. In W. Keup (Ed.), 1970, op. cit.

84. Jackson, P.W., & Messick, S. Creativity. In P. London & D. Rosenhan (Eds.), Foundations of abnormal psychology. New York: Holt, Rinehart & Winston, 1968.

85. Jarvik, M. Drugs, hallucinations and memory. In W. Keup (Ed.) 1970, op. cit.

86. Johannsen, W.J., & Testin, R.F. Assimilation of visual information. A function of chronicity in schizophrenia. Archives of General Psychiatry, 1966, 15, 492-498.

87. Johnson, M.H., & Ries, H.A. A self-report scale for process-reactive schizophrenia. Journal of Nervous and Mental Disease, 1966, 143, 481-483.

88. Kantor, R.E., & Herron, W.G. Reactive and process schizophrenics. Palo Alto: Science and Behavior Books, 1966.

89. Kantor, R., Wallner, J., & Winder, C. Process and reactive schizophrenia. Journal of Consulting Psychology, 1953, 17, 157-162.

90. Kaplan, A.R., (Ed.). Genetic factors in "schizophrenia". Springfield, Ill.: Charles C. Thomas, 1972.

91. Kaplan, B., (Ed.). The inner world of mental illness. New York: Harper & Row, 1964.

92. Kellogg, C.E., & Morton, N.W. Revised Beta Examination Manual. New York: The Psychological Corporation, 1957.

93. Keup, W.,(Ed.). Origins and mechanisms of hallucinations. New York: Plenum Press, 1970. Proceedings of the 14th Annual Meeting of the Eastern Psychiatric Research Association. New York, November 1969.

94. Kilburg, R.R., & Siegel, A.W. Formal operations in reactive and process schizophrenics. Journal of Consulting and Clinical Psychology, 1973, 40, 371-376.

95. Kretschmer, E. Physique and character. New York: Harcourt & Brace, 1925.

96. Krill, A.E. Hereditary retinal and choroidal diseases. New York: Harper & Row, 1977.

97. Kubie, L.S. The unfortunate concept of schizophrenia. In A.R. Kaplan, (Ed.), 1972, op. cit.

98. Lang, J. The other side of hallucinations, Part I. American Journal of Psychiatry, 1938, 94, 1089-1097.

99. Lang, J. The other side of hallucinations, Part II. American Journal of Psychiatry, 1939, 96, 423-430.

100. Langfeldt, G. The diagnosis of schizophrenia. American Journal of Psychiatry, 1951, 108, 123-125.

101. Lapidus, L.B., & Schmolling, P. Anxiety, arousal and schizophrenia: a theoretical integration. Psychological Bulletin, 1975, 82, 689-710.

102. Levin, M. Bromide hallucinosis. Archives of General Psychiatry, 1960, 2, 429-433.

103. Lewinsohn, P.M. Characteristics of patients with hallucinations. Journal of Clinical Psychology, 1967, 24, 423.

104. Lewinsohn, P.M. An empirical test of several popular notions about hallucinations in schizophrenic patients. In W. Keup (Ed.), 1970, op. cit.

105. Lindemann, E. Symptomatology and management of acute grief. American Journal of Psychiatry, 1944, 101, 141-148.

106. Lindner, R.M., & Gurvitz, M. Restandardization of the Revised Beta Examination to yield the Wechsler type of I.Q. Journal of Applied Psychology, 1946, 30, 649-658.

107. Linn, E.L. Verbal auditory hallucinations, mind, self and society. Journal of Nervous and Mental Disease, 1977, 164, 8-17.

108. Lowe, G.R. The phenomenology of hallucinations as an aid to differential diagnosis. British Journal of Psychiatry, 1973, 123, 621-633.

109. MacDonald, N. Living with schizophrenia. In B. Kaplan (Ed.), The inner world of mental illness. New York: Harper & Row, 1964.

110. MacKinnon, D. The nature and nurture of creative talent. In B. Semeonoff (Ed.), Personality assessment. Baltimore: Penguin Books, 1966.

111. Malitz, S., Wilkens, B., & Esecover, H. A comparison of drug-induced hallucinations with those seen in spontaneously occurring psychoses. In L.J. West (Ed.), 1962, op. cit.

112. Medlicott, R.W. An inquiry into the significance of hallucinations with special reference to their occurrence in the sane. International Record of Medicine, 1958, 171, 664-677.

113. Mendelson, J.P., Solomon, P., & Lindemann, E. Hallucinations of polyomyelitis patients during treatment in a respirator. Journal of Nervous and Mental Disease, 1958, 126, 421-428.

114. Menninger, K.A. The human mind. New York: Alfred A. Knopf, 1949.

115. Mersky, H., & Tonge, W.L. Psychiatric illness. London: Ballier, Tindall & Cox, 1974.

116. Milici, P. Postemotive schizophrenia. Psychiatric Quarterly, 1939, 13, 278-293.

117. Mintz, S., & Alpert, M. Imagery vividness, reality-testing and schizophrenic hallucinations. Journal of Abnormal Psychology, 1972, 79, 310-316.

118. Moray, N. Attention in dichotic listening: affective cues and the influence of instructions. Quarterly Journal of Experimental Psychology, 1959, 11, 56-60.

119. Mott, R.H., Small, I.F., & Anderson, J.M. Comparative study,

of hallucinations. Archives of General Psychiatry, 1965, 12, 595-601.

120. McCabe, M.S., Fowler, R.C., Cadoret, R.J., & Winokur, G. Symptom differences in schizophrenia with good and poor prognosis. American Journal of Psychiatry, 1972, 128, 1239-1243.

121. Normington, C.J. Time estimation in process-reactive schizophrenia. Journal of Consulting Psychology, 1967, 31, 222.

122. Oberndorf, C.P. Time - its relation to reality and purpose. Psychoanalytic Review, 1941, 28, 139-155.

123. O'Conner, N. Reminiscence and work decrement in catatonic and paranoid schizophrenics. British Journal of Medical Psychology, 1957, 30, 188-193.

124. Orme, J.E. Time estimation and personality. Journal of Mental Sciences, 1962, 108, 213-216.

125. Orme, J.E. Time estimation and the nosology of schizophrenia. British Journal of Psychiatry, 1966, 112, 37-39.

126. Paskind, H.A., & Brown, M. Psychosis resembling schizophrenia occurring with emotional stress and ending in recovery. American Journal of Psychiatry, 1940, 36, 1379-1388.

127. Pavlov, I.P. A brief outline of the higher nervous activity. In C. Murchison (Ed.), Psychologies of 1930. Worchester: Clark, 1930.

128. Payne, R.W., Caird, W.K., & Laverty, S.G. Overinclusive thinking and delusions in schizophrenics. Journal of Abnormal and Social Psychology, 1964, 68, 562-566.

129. Penrose, L.S. Psychotic profiles and sex profiles shown by a test battery. American Journal of Psychiatry, 1945, 101, 810-813.

130. Peters, H.N. Multiple choice learning in the chronic schizophrenic. Journal of Clinical Psychology, 1953, 9, 328-333.

131. Petzel, T.P., & Johnson, J.E. Time estimation by process and reactive schizophrenics under crowded and uncrowded conditions. Journal of Clinical Psychology, 1972, 28, 345-347.

132. Pfeifer, L. A subjective report of tactile hallucinations in schizophrenia. Journal of Clinical Psychology, 1970, 26, 57-60.

133. Phillips, L. Case history data and prognosis in schizophrenia. Journal of Nervous and Mental Disease, 1953, 117, 515-525.

134. Porteus, S.D. Revised Beta Examination. In O.K. Buros (Ed.), The nineteen forty mental measurement yearbook. Highland Park, N.J.: The Mental Measurement Yearbook, 1941, No. 1419.

135. Prado, W.M., & Schnadt, F. Differences in WAIS-WB functioning of three psychiatric groups. Journal of Clinical Psychology, 1965, 21, 184-186.

136. Rabin, A.I. Time estimation of schizophrenics and non-psychotics. Journal of Clinical Psychology, 1957, 13, 88-90.

137. Redlich, F.C., & Freedman, D.X. The theory and practice of psychiatry. New York: Basic Books Inc., 1966.

138. Reitman, E., & Cleveland, S.E. Changes in body image following sensory deprivation in schizophrenic and control groups. Journal of Abnormal and Social Psychology, 1964, 68, 168-177.

139. Roman, R., & Landis, C. Hallucinations and mental imagery. Journal of Nervous and Mental Disease, 1945, 102, 327-331.

140. Rosenhan, D.L. On being sane in insane places. Science, 1973, 179, 250-258.

141. Salzinger, K. Schizophrenia: behavioral aspects. New York: John Wiley & Sons, Inc., 1973.

142. Savage, C.W. The continuity of perceptual and cognitive experiences. In R.K. Siegel, & L.J. West (Eds.), 1975, op.cit.

143. Schilder, P. Experiments on imagination, after-images and hallucinations. American Journal of Psychiatry, 1933, 13, 597-611.

144. Schneider, K. Primäre und sekundäre symptome bei der schizophrenie. Fortschritte der Neurologie, Psychiatrie und ihrer grenzgebiete, 1957, 25, 487. (Cited in WHO, Schizophrenia: a multinational study. Geneva: WHO, 1975).

145. Schneider, K. Psychopathic personalities. (M.W. Hamilton, trans.). London: Cassell, 1958.

146. Schneider, S.J. Selective attention in schizophrenia. Journal of Abnormal Psychology, 1976, 85, 167-173.

147. Schooler, C., & Feldman, S.E. Experimental studies of schizophrenia. Goleta, Calif.: Psychonomic Press, 1967.

148. Schwartz, S. Diagnosis, level of social adjustment, and cognitive deficits. Journal of Abnormal Psychology, 1967, 72, 446-450.

149. Schwartzman, A.E., & Douglas, V.I. Intellectual loss in schizophrenia: Part I. Canadian Journal of Psychology, 1962, 16, 1-10.

150. Schwartzman, A.E., Douglas, V.I., & Muir, W.R. Intellectual loss in schizophrenia: Part II. Canadian Journal of Psychology, 1962, 16, 161-168.

151. Sedman, G. A comparative study of pseudohallucinations, imagery, and true hallucinations. British Journal of Psychiatry, 1966, 112, 9-17.

152. Segal, S.J. Imagery and reality: can they be distinguished? In W. Keup (Ed.), 1970, op. cit.

153. Shurley, J.T. Profound experimental sensory isolation. American Journal of Psychiatry, 1960, 117, 539-545.

154. Shurley, J.T. Hallucinations in sensory deprivation and sleep deprivation. In L.J. West (Ed.), 1962, op. cit.

155. Siegel, R.K., & Jarvik, M.E. Drug-induced hallucinations in animals and man. In R.K. Siegel, & L.J. West, (Eds.), 1975, op. cit.

156. Siegel, R.K., & West, L.J. Hallucinations: Behavior, experience and theory. New York: John Wiley & Sons, 1975.

157. Silverman, A.J., Cohen, S.I., Bressler, B., & Shmavonian, M. Hallucinations in sensory deprivation. In L.J. West, (Ed.), 1962, op. cit.

158. Simon, T. Sur la pathogénie des hallucinations. Annales médico-psychologiques, 1937, 95 (2), 93-109.

159. Slade, P.D. Case histories and shorter communications, the effects of systematic desensitisation on auditory hallucinations. Behaviour Research and Therapy, 1972, 10, 85-91.

APPENDIX III

Hallucination Inventory

1. Have you ever had experiences that seemed like dreams except that you were awake at the time?
2. Sometimes people will see things when they are awake that other people around them will not see. Have you ever had such experiences?
3. Sometimes people hear things when they are awake that other people around them do not hear. Has this happened to you?
4. Have you ever smelled odours that nobody else present could smell?
5. Have you ever had peculiar taste sensations that were not due to stomach upset or something that happens to other people also?
6. Have you ever had the sensation of strange body feelings, as from electricity or as if you were being touched or crawled upon?
7. Have you ever had the sensation of being pushed, or penetrated in a strange way?
8. Have you ever had the sensation of being affected sexually by some person or force in a mysterious way?
9. Have you ever felt your bowels or heart or other internal organ changing or being influenced in some mysterious manner?
10. Have you ever felt that your body gave off an unpleasant odour?
11. Have you ever had the sensation that you were flying when in actual fact you were not?
12. Have you ever felt that your own thoughts were spoken aloud?

Specific sensory hallucinations

Auditory hallucinations

Voices

Origin

13. Does the voice or voices originate from inside the head? (specify location exactly).

14. From outside the head? (specify location exactly).

15. From inside the body (specify region).

16. From specific source (e.g. television, telepathy, etc. Specify)

Form

17. Can it be heard as clearly as ordinary voices?

18. Does it consist of one voice?

19. Does it consist of two or more voices?

20. Voices talk to patient.

21. Voices talk about patient.

22. Voices speak in whole sentences.

23. Voices carry on whole conversation.

24. Voices come from long distance away.

25. Voices are familiar, belonging to friends, neighbors or relatives (specify).

26. Voices repeat patient's thoughts.

27. Patient hears her/his thoughts aloud, like a voice.

28. Voices are unreal ("Probably just my imagination").

29. Voices may be unreal ("I'm not sure").

30. Voices are definitely real.

31. Voices are women's.

32. Voices are men's.

33. Voices may be either female or male.

34. Voices are louder than when people usually talk.

35. Not as loud.

36. About the same loudness.

Content

37. Voices say nice things about patient.

38. Voices say unpleasant things about patient.

39. Voices warn or otherwise try to influence patient to take action (specify).

40. Content included nonsense words or foreign or strange language.

41. Content is sexual.

42. Voices have suggested suicide.

43. Has the content changed since you first heard voices? (Specify).

Duration

44. Voices last only a few minutes at a time.

45. Hours.

46. Days.

47. Voices occur at a particular time of the day (e.g. morning, evening, etc. - specify).

Frequency

48. Voices are heard every day.

49. Every week.

50. Occasionnally (specify).

51. Rarely (specify).

52. Occurred for a given period only, and has never reappeared since.

53. Give approximate time when voices were heard for the first time.

Patient's reaction

54. Patient responds appropriately to voices, e.g. gets angry, is pleased, etc.

55. Patient is indifferent to voices.

56. Patient enjoys voices.

57. Patient wishes voices would go away.

58. Voices distract patient, making it hard for her/him to concentrate.

59. Voices do not stop patient from doing other things comfortably while hearing them.

60. Patient tells people about voices.

61. Patient converses with voices.

62. Patient believes she/he deserves things being said about her/him by voices.

63. Patient acts upon warning or command from voices.

64. Patient puts cotton in her/his ears to avoid voices.

65. Patient can turn voices "on and off" by shifting attention and talking.

Contingency factors

66. Voices only occur when patient is alone.

67. Voices occur whether or not people are around.

68. Voices occur only when patient is unoccupied or inactive.

69. Voices occur whether or not patient is occupied.

70. Voices occur at specific times of the day (e.g. before or after meals, bedtime, etc.).

71. Voices stop patient from sleeping.

Music

Origin

72. Inside the head (specify location).

73. Outside the head (specify location).

74. Inside the body (specify region).

75. From specific source (specify).

Form

76. Can be heard clearly.

77. Seems to come from long distance away.

78. Is very loud.

79. Is very soft, difficult to hear clearly.

80. Same loudness as noise in the environment.

Content

81. Music is known to patient (specify).

82. Music is unknown to patient (specify).

Duration

83. Minutes, hours, days.

84. Occurs at a particular time of the day (specify).

Frequency

85. Music is heard every day, every week..

86. Occasionnally (specify).

87. Rarely (specify).

88. Occurred for a certain period only and has never reappeared since.

89. Give approximate time when music was heard for the first time.

Patient's reaction

90. Patient enjoys music.

91. Patient wishes it would go away.

92. Music distracts patient, making it hard for her/him to concentrate.

93. Patient can do other things comfortably while hearing music.

94. Patient tells people about it.

95. Patient puts cotton in ears to avoid music.

96. Patient can turn music "on and off" by shifting attention or talking.

Contingency factors

97. Occurs only when patient is alone.

98. Occurs whether or not patient is alone.

99. Occurs only when patient is unoccupied.

100. Occurs whether or not patient is occupied.

101. Occur at specific times of the day (e.g. before or after meals, betime, etc.).

102. Music stops patient from sleeping.

Other auditory hallucinations

103. Strange sounds like popping, clicking, snapping, etc. (specify).

104. Screaming.

105. Origin.

106. Form.

107. Content.

108. Duration.

109. Frequency.

110. Patient's reaction.

111. Contingency factors.

Visual hallucinations

Form

112. Can be seen as clearly as ordinary visions.

113. Is seen as through a gauze, like a phantom.

114. Is fuzzy.

115. In black and white.

116. In colours.

117. Normal size.

118. Smaller than usual.

119. Bigger than usual.

120. Deformed, distorted.

121. Normal shape.

122. Vision gets mixed with the background.

123. Vision is seen by distortion of an actual object in the environment (specify).

Content

124. Patient sees herself/himself.

125. Sees own internal organs (specify).

126. Sees people.

127. Known or unknown people (specify).

128. Sees animals (specify).

129. Sees things (specify).

130. Sees flashes of light.

131. Sees fire.

132. Sees object behind own head.

133. Does not see self in mirror.

134. Sees animated scene.

135. Sees non-animated scene (everything looks still).

136. Other (specify).

Duration

137. Minutes, hours, days.

138. Occurs at a particular time of the day (specify).

Frequency

139. Every day, every week.

140. Occasionnally (specify).

141. Occurred for a certain period only, and has never reappeared since.

142. Give approximate time when visions first appeared.

Patient's reaction

143. Patient responds appropriately.

144. Patient is indifferent.

145. Patient enjoys visions.

146. Patient wishes they would go away.

147. Visions distract patient, making it hard for her/him to concentrate.

148. Patient can do other things comfortably while seeing visions.

149. Patient is afraid of visions.

150. Patient tells people about visions.

151. Patient tries not to see visions by closing eyes, changing room, etc. (specify).

152. Patient can make vision go away.

153. How (specify).

Contingency factors.

154. Visions only occur when patient is alone.

155. Visions disappear when patient closes eyes.

156. Content of visions has changed from time of onset (specify).

157. Visions only occur when patient is unoccupied.

158. Visions occur whether or not patient is occupied.

159. Visions occur at specific times of the day (specify).

Tactile hallucinations

Location

160. Inside the body (specify).

161. Outside the body (e.g. skin) (specify).

Form

162. Animals crawling.

163. Bugs, insects.

164. Other (specify).

Duration

165. Minutes, hours, days.

166. Occurs at a particular time of the day (specify).

Frequency

167. Every day, every week.

168. Occasionnally (specify).

169. Occurred for a certain period only, and has never reappeared since.

170. Approximate time of original onset.

Patient's reaction

171. Patient enjoys it.

172. Patient wishes it would go away.

173. It distracts patient, making it hard for her/him to concentrate.

174. Patient can do other things comfortably while experiencing it.

175. Patient tells people about it.

176. Patient tries to get rid of sensation by some action (specify).

Contingency factors

177. Occurs only when patient is alone.

178. Occurs in the presence of people.

179. Occurs only when patient is unoccupied.

180. Occurs whether patient is occupied or not.

181. Occurs at specific times of the day (specify).

182. The sensation has changed from time of onset (specify).

Gustatory hallucinations.

Content

183. Specify the taste.

Duration

184. Minutes, hours, days.

185. Occurs at a particular time of the day or night (specify).

Frequency

186. Every day, every week.

187. Occasionnally (specify).

188. Occurred for a certain period only, and has never reappeared since.

189. Is a permanent sensation since...

190. Approximate time of original onset.

Patient's reaction

191. Sensation is pleasant.

192. Sensation is unpleasant.

193. Sensation is distracting.

194. Sensation is not distracting.

195. Patient tells people about it.

196. Patient tries to get rid of sensation by some action (specify).

Contingency factors

197. Occurs only when patient is alone.

198. Occurs in the presence of people.

199. Occurs only when patient is unoccupied.

200. Occurs whether or not patient is occupied.

201. Occurs at specific times of the day or night (specify).

202. Remains or disappears while patient is eating.

203. The sensation has changed from time of onset (specify).

Olfactory hallucinations

Origin

204. Originates from self.

205. Originates from other people (specify).

206. From animals (specify).

207. From objects (specify).

208. Other (specify).

Content

209. Poison gas.

210. Perfume.

211. Cooking odour.

212. Other (specify).

Duration

213. Minutes, hours, days.

214. Occurs at a particular time of the day (specify).

Frequency

215. Every day, every week.

216. Occasionnally (specify).

217. Occurred for a certain period only, and has never reappeared since.

218. Is a permanent sensation since...

219. Approximate time of original onset.

Patient's reaction

220. Sensation is pleasant.

221. Sensation is unpleasant.

222. Sensation is distracting.

223. Sensation is not distracting.

224. Patient tells people about it.

225. Patient recognises the odour as a familiar one (specify).

Contingency factors

226. Patient can stop the sensation (specify how).

227. Occurs only when patient is alone.

228. Occurs whether or not patient is alone.

229. Occurs only when patient is unoccupied.

230. Occurs whether patient is occupied or not.

231. The sensation has changed from time of onset (specify).

General

232. Events or circumstances surrounding the first occurrence of the hallucinations.

233. Date of onset (approximately).

234. Patient's reaction at the time.

235. Does patient still experience these hallucinations at present?

236. If not, when did they stop (approximately).

237. While hallucinating does patient become inactive?

238. While hallucinating does patient continue ongoing activity?

239. Did onset of hallucinations occur following period of insomnia?

240. Physical illness?

241. Unusual hard work?

242. Alcohol abuse?

243. Social isolation?

244. Pregnancy and delivery?

APPENDIX IV

Ullmann & Giovannoni Process-Reactive Self-Report Scale

Male version

	Scoring key*
1. When I leave the hospital, I will live with my wife.	T
2. I am married now.	T
3. I have fathered children.	T
4. I have been married.	T
5. Before I was seventeen I had left the home I was raised in and never went back except for visits.	T
6. When I leave the hospital, I will live with one or both of my parents.	F
7. As a civilian I have worked steadily at one job or for one employer for over two years.	T
8. I finished at least one year of education after high school - trade apprenticeship, business school, college, etc.	T
9. Adding up all the money I earned for the last three years it comes to less than $1,500., before deductions.	F
10. In my teens I was a member of a group of friends who did things together.	T
11. I hardly ever went over to another kid's house after school or on weekends.	F

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* Scored in the reactive direction.

12. When I was in school I didn't like Physical Education classes. F

13. Alcohol has nothing to do with my difficulties. F

14. I have paid regularly to buy a house. T

15. More than once in the last year I have stayed on after some group meeting and talked with some other members about something that went on. T

16. Shortly before I came into the hospital there was some major change in my life - such as marriage, birth of a baby, death, injury, loss of job, etc. T

17. I have been deeply in love with someone and have told them about it. T

18. In the kind of work I do, it is expected that people will stay for at least a year. T

19. My top wage in the last five years was less than $2.00 an hour. F

20. I have earned my living for longer than a year at fulltime civilian work. T

21. I have had to stay in a mental hospital for more than one year at a time. F

22. Within the last five years I have spent more than half of the time in a mental hospital. F

23. In my teens I was a regular member of a club or organization that had a grown-up who came to meetings. (Scouts, school club, 4-H, church youth club, etc.) T

24. In my teens, there was more than one girl with whom I had more than two dates. T

APPENDIX V

Ullmann & Giovannoni Process-Reactive Self-Report Scale

Female version

	Scoring key
1. When I leave the hospital, I will live with my husband.	T
2. I am married now.	T
3. I have mothered children.	T
4. I have been married.	T
5. Before I was seventeen I had left the home I was raised in and never went back except for visits.	T
6. When I leave the hospital, I will live with one or both of my parents.	F
7. I have worked steadily at one job or for one employer for over two years.	T
8. I finished at least one year of education after high school - trade apprenticeship, business school, secretarial school, college, etc.	T
9. Adding up all the money I earned for the last three years, it comes to less than $1,500. before deductions	F
10. In my teens I was a member of a group of friends who did things together	T
11. I hardly ever went over to another kid's house after school or on weekends.	F

12. When I was in school I didn't like arts classes. F

13. Alcohol has nothing to do with my difficulties. F

14. I have looked after the running of my home regularly. T

15. More than once in the last year, I have stayed on after some group meeting and talked with some other members about something that went on. T

16. Shortly before I came into the hospital there was some major change in my life - such as marriage, birth of a baby, death, injury, loss of job, etc. T

17. I have been deeply in love with someone and have told them about it. T

18. In the kind of work I do, it is expected that people will stay for at least a year. T

19. My top wage in the last five years was less than $2.00 an hour. F

20. I have earned my living for longer than a year at fulltime work before I got married. T

21. I have had to stay in a mental hospital for more than one year at a time. F

22. Within the last five years I have spent more than half of the time in a mental hospital F

23. In my teens I was a regular member of a club or organization that had a grown-up who came to meetings - guides, school club, church youth club, etc. T

24. In my teens there was more than one boy with whom I had more than two dates. T

APPENDIX VI

The Johnson & Ries Process-Reactive Self-Report Scale

Male Version

	Scoring key*
1. I am not married.	F
2. When I was in my teens, my circle of friends did not include any girls.	F
3. There are not many people that I really feel are my friends.	F
4. I prefer games like chess or cards to football or basketball.	F
5. I have not gone with the same girl for any length of time.	F
6. I never dated when I was younger.	F
7. My employment record is good.	T
8. I have never had a very active sexual life.	F
9. I do not get involved with others.	F
10. I have gone out with girls but not much.	F
11. In my teens I liked to go to parties where there were many boys and girls.	T
12. I do not have as many friends as others do.	F
13. I have had sexual intercourse with many girls.	T

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* Scored in the reactive direction.

14. I have never learned a trade. F

15. I am constantly on the go because of my many activities. T

16. At school I had many friends. T

17. I have never really had a girl friend. F

18. As a teenager I preferred to be alone. F

19. I liked to date girls as often as possible when I was a teenager. T

20. I have a friend that I can talk with about personal things. T

21. I am heavy-set in build. T

22. I fell in love for the first time while still in my teens. T

23. I am happily married. T

24. I like to be left alone. F

25. I did not have a steady girl friend when I was younger. F

26. I had many close friends when I was a teenager. T

27. I have one or two very close friends. T

28. I had sexual relations with my steady girl friend. T

29. I had sexual intercourse for the first time when I was a teenager. T

30. People seem to like me. T

31. I have never been in love. F

32. I had dates when I was younger. T

33. I have lived with the same woman for several years. T

34. I have many friends. T

35. Marriage does not interest me. F

APPENDIX VII

The Johnson & Ries Process-Reactive Self-Report Scale

Female Version

	Scoring key
1. I am not married.	F
2. When I was in my teens, my circle of friends did not include any boys.	F
3. There are not many people that I really feel are my friends.	F
4. I prefer activities like reading than dancing.	F
5. I have not gone with the same boy for any length of time.	F
6. I never dated when I was younger.	F
7. My employment record is good.	T
8. I have never had a very active sexual life.	F
9. I do not get involved with others.	F
10. I have gone out with boys but not much.	F
11. In my teens I liked to go to parties where there were many boys and girls.	T
12. I do not have as many friends as others do.	F
13. I have had premarital sexual intercourse.	T
14. I have never had a skill for work.	F
15. I am constantly on the go because of my many activities.	T
16. At school I had many friends.	T

17. I have never really had a boyfriend F

18. As a teenager I preferred to be alone. F

19. I liked to date boys as often as possible when I was a teenager. T

20. I have a friend that I can talk with about personal things. T

21. I have a weight problem. T

22. I fell in love for the first time while still in my teens. T

23. I am happily married. T

24. I like to be left alone. F

25. I did not have a steady boyfriend when I was younger. F

26. I had many close friends when I was a teenager. T

27. I have one or two very close friends. T

28. I had sexual relations with my steady boyfriend. T

29. I had sexual intercourse for the first time when I was a teenager. T

30. People seem to like me. T

31. I have never been in love. F

32. I had dates when I was younger. T

33. I have lived with the same man for several years. T

34. I have many friends. T

35. Marriage does not interest me. F

APPENDIX VIII

Randomly determined order of Test Presentation

	Test presentation			
	I	II	III	IV
Subjects		Tests*		
1	4	1	3	2
2	1	2	4	3
3	2	1	3	4
4	3	1	2	4
5	4	3	2	1
6	3	2	1	4
7	1	3	4	2
8	3	4	1	2
9	4	1	3	2
10	2	4	3	1
11	3	2	1	4
12	4	2	3	1
13	2	1	3	4
14	1	3	2	4
15	4	2	3	1

* Test 1: Time estimation; Test 2: Picture completion; Test 3: Error recognition; Test 4: Pseudo Isochromatic Plates.

APPENDIX IX

Hallucinatory experience reported by the 15 patients comprising the Hallucinating Schizophrenic group

Experience	No. of patients
Type of hallucinations	
Auditory	15
voices	15
music	3
screaming	6
clicking sounds	3
water splashing	1
Visual	10
Olfactory	6
Tactile	5
Gustatory	2
Origin	
Auditory hallucinations n: 15	
From outside the head only	7
From inside the head only	1
Sometimes inside, sometimes outside	7
From the stomach	3
From the radio and television	9
From "telepathic communications"	6

From noisy backgrounds	13
Olfactory hallucinations n: 6	
From self	1
From others	2
Unknown origin	3
Form and content	
Auditory hallucinations - voices n: 15	
Heard as clearly as ordinary voices	15
Consists of one voice only	3
Consists of many voices always	10
Varies	2
Women's voices only	1
Men's voices only	6
Both men's and women's voices	8
Voices belong to relatives	6
Voices belong to friends	7
Voices belong to public personalities	1
Voices are attributed to God and the devil	5
Voices vary as to their owner	11
Voices are unfamiliar sometimes	8
Voices seem to come from long distance away always	2
sometimes	6
Voices are louder than when people usually talk	
always	1
sometimes	9

Voices are not as loud	always	1
	sometimes	7
Voices are about the same loudness	always	4
	sometimes	5
Voices talk to patient		15
Voices talk about patient		8
Voices speak in whole sentences	always	14
	sometimes	1
Voices repeat patient's thoughts		8
Voices sometimes say nice things to patient		6
Voices say unpleasant things to patient	always	5
	sometimes	8
Voices try to influence patient to take action		14
Voices have suggested suicide		9
Content is sexual sometimes		7
Content includes nonsense words or strange language		4
Voices are definitely real		13
Voices may be unreal ("I'm not sure")		2

Music n: 3

Heard inside the head	1
Heard outside the head	1
Varies	1
Can be heard clearly	3
Same loudness as noise in the environment	3
Music is known to patient	1

Music is unknown to patient	2
Visual hallucinations n: 10	
Seen as clearly as ordinary visual perceptions	7
Is seen as through a gauze, like a phantom	2
Is fuzzy	1
In black and white	1
In colours	9
Normal size	6
Bigger than usual	2
Smaller than usual	1
Varies	1
Normal shape	9
Deformed, distorted	1
Patient sees self	5
Sees other people	10
Sees known people sometimes	6
Sees unknown people sometimes	7
Sees animals	3
Sees flashes of light	5
Sees inanimate objects	5
Sees animated scenes	9
Sees non-animated scene (everything looks still)	1
Tactile hallucinations n: 5	
Animals crawling	3
Bugs, insects inside body	1
Cold wind from unknown origin	1

Olfactory hallucinations n: 6

Poison gas		1
Perfume		2
Cooking odours		3
Burning odours		2
Putrid smell		3
Blood		1
Metal		1

Gustatory hallucinations n: 2

Blood		1
Various tastes		1

Duration and frequency

Auditory hallucinations - Voices n: 15

Voices last a few minutes at a time	usually	3
	sometimes	6
Voices sometimes last for hours		6
Voices last for days without stop	usually	5
	sometimes	7
Voices are more prominent during the evening		7
Voices are heard every day		15
Voices usually occur when patient is alone		2
Voices occur whether or not people are around		13
Voices usually occur when patient is unoccupied		2
Voices occur whether or not patient is occupied		13
Voices stop patient from sleeping		12

Music n: 3

Music is heard a few minutes at a time	3
Music was heard a few times only	3

Visual hallucinations n: 10

Last a few minutes at a time	4
Last for hours	4
Last for days	2
More frequent during the evening	1
Occur every day	5
Occur approximately every week	2
Occur occasionnally	2
Occurred intensely for a while, has not reappeared since	1
Always occur when patient is alone	3
Occur whether or not patient is alone	8
Only occur when patient is unoccupied	2
Occur whether or not patient is occupied	8

Tactile hallucinations n: 5

Last a few minutes at a time	3
Last for hours	1
Last for days	1
Occur every day	1
Occurred for a certain period only	2
Occur only when patient is alone	1
Occur whether or not patient is alone	4
Occur whether or not patient is occupied	5

Olfactory hallucinations n: 6

Last a few minutes at a time	5
Last for hours	1
Occur every day	1
Occur every week	1
Occur irregularly	4
Occur whether or not patient is alone	6
Occur whether or not patient is occupied	6

Gustatory hallucinations n: 2

Last a few minutes at a time	2
Occur irregularly	2
Occur whether or not patient is alone	2
Occur whether or not patient is occupied	2
Disappear when patient is eating	2

Patient's reaction

Auditory hallucinations - Voices n: 15

Patient seems to respond appropriately	15
Patient is afraid of voices	9
Patient wishes voices would go away	13
Patient enjoys voices	2
Voices make it hard for patient to concentrate	12
Patient converses with voices usually	8
sometimes	5
Patient acts upon warning or command from voices usually	6

	sometimes	7
	never	1
Patient can turn voices on and off by shifting attention and talking	usually	1
	sometimes	5
	never	9
Patient has tried putting cotton in ears but to no avail		7
Patient believes that everyone hears voices but denies it		5
Patient thinks that everyone hears voices but is not sure if it is true		5

Music n: 3

Patient wishes it would go away	1
Patient enjoys music	2
Patient can do other things comfortably while hearing music	3

Visual hallucinations n: 10

Patient wishes it would go away		7
Patient enjoys it		2
Patient is indifferent		1
Patient is afraid of visions		4
Visions make it hard for patient to concentrate		7
Patient can make visions go away	usually	3
	sometimes	2
	never	5