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The Predictability of Speech in Schizophrenic Patients

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SUMMARY Previous research has suggested that schizophrenic speech is less predictable than normal speech. Two experiments designed to test the suggestion are reported, both of them based on Cloze Procedure. In the first, raters were asked to predict ten passages of schizophrenic speech and ten passages of normal speech under fourth-word deletion. No difference between the two types of passage was found. In the second, a modified form of presentation was introduced which prevented raters making use of the text which follows a blank. Once again, no difference was revealed between the schizophrenic and normal passages, and this was true for both the new and traditional forms of presentation, and for both fourth-word and fifth-word deletion patterns. The investigation is discussed in the light of previous findings, and a number of suggestions concerning methodology and forms of analysis are made for future research.

Introduction

Several writers have suggested that schizophrenic speech may be less predictable than normal speech. Most of the research has made use of Cloze Procedure (Taylor, 1953), in which an uninterrupted passage from each speaker is first recorded, and a transcript is prepared in which abbreviations are expanded into their full form, and 'ers' and 'ums', stutters, and punctuation are omitted. Every fifth word is then deleted and replaced by a blank, and raters are asked to guess the missing words. The proportion of blanks correctly filled, the Cloze Score, is calculated and may be taken as an index of predictability: the higher the score the more predictable the passage.

The predictability of schizophrenic speech was first investigated with Cloze Procedure by Salzinger, Portnoy and Feldman (1964). They found that for twelve of thirteen matched pairs of schizophrenic and normal speakers the schizophrenic passage was the less predictable, though the difference was less marked in the first half of the 200-word passages than in the second. Silverman (1972) confirmed that the speech of 'actively schizophrenic' patients was less predictable than that of a control group of 'other' patients, but Cheek and Amarel (1968) could find no difference between 'chronic, regressed schizophrenics' and matched alcoholic patients. Similarly, Rutter, Wishner and Callaghan (1975) found no clear difference between schizophrenic and normal speech, though they did find that schizophrenic raters were less able than normals to predict both types of speech. Silverman's finding was particularly marked when every fourth rather than every fifth word was deleted, while Salzinger *et al* (1970), using a rather different procedure, had reported that, if anything, the difference between schizophrenic and normal speech diminished with decreased context. In the only other published studies, Hart and Payne (1973) reported that the speech of 'overinclusive' psychiatric patients was less predictable than that of 'non-over-inclusive' patients, while Rutter, Draffan and Davies (1977), in a study of twenty recently admitted schizophrenic patients, could find no relation between the predictability of their speech and their scores

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on the Bannister-Fransella test of schizophrenic thought disorder.

The purpose of this paper is to present two attempts to extend and clarify previous findings. In the first experiment, schizophrenic and normal passages were compared under fourth-word deletion. In the second, a modified form of presentation was introduced which prevented raters making use of the text which follows a given blank, and both fourth- and fifth-word deletion were incorporated.

Experiment 1

Hypothesis

The first experiment tested the hypothesis that schizophrenic speech would be less predictable than normal speech.

Method

Material. Uninterrupted speech samples of 203 words were collected from ten non-paranoid schizophrenic patients recently admitted to local psychiatric hospitals and from ten psychiatrically normal patients recently admitted to the rehabilitation unit of a local orthopaedic hospital. Consecutive schizophrenic* admissions aged 18–60 were approached by one of the experimenters if they had been given a clear diagnosis by the admitting doctor and were physically fit to take part. All were receiving medication. Orthopaedic patients were selected in the same way, with the additional constraints that they should have no history of overt psychiatric breakdown, and that the groups should be comparable for sex, age, social class, and educational attainments. Each patient was asked, as part of a short tape-recorded interview to describe as fully as possible the reasons for his admission to hospital. The interviewer, who was the third author, took care not to interrupt and to provide no reinforcement. The material was transcribed, and typescripts of each passage were prepared for Cloze procedure under fourth-word deletion.

Raters and procedure. Six science undergraduates, none of whom was reading Psychology or had taken part in any similar experiment, acted as raters. Each was asked to 'Cloze' all twenty passages, which were described as continuous speech samples from 'hospital patients' in an 'interview', and the order was randomized for each rater. The procedure was self-paced with no time limit, but it was stressed that every blank must be filled.

* Schizophrenia is generally defined more narrowly in Britain than in the USA (Cooper *et al*, 1972).

Results

Cloze Scores were calculated separately for the first and second parts of each passage, and the factors, 'Material' (Schizophrenic/Normal), and 'Parts' (Part I/Part II), were examined by analysis of variance, with repeated measures on the second factor (Winer, 1970, page 302). Means and a summary of the analysis are given in Table I. No significant difference was found between schizophrenic and normal speech ($F = 1{\cdot}6$; df 1, 18; $P > {\cdot}20$). Moreover, the first and second halves of both types of passage were equally predictable, and the similarity between schizophrenic and normal speech was consistent across the two halves. Thus the hypothesis received no support, and in addition neither Salzinger's suggestion that schizophrenic speech becomes increasingly difficult to predict as the passage continues, nor Silverman's suggestion that fourth-word deletion produces a particularly marked difference between schizophrenic and normal speech were supported.

The pattern of findings is strikingly different from many previous results, but there is an important methodological detail which may help to explain the discrepancy. In traditional Cloze Procedure, the rater is able to make use of information from anywhere in the passage to help him guess each blank. As well as drawing on the context which precedes a blank, he can use any of the text which follows it,

TABLE I

Experiment 1: Mean Cloze scores

	Part I		Part II	
	Mean	SD	Mean	SD
Schizophrenic	45·3	8·0	49·1	15·8
Normal ..	50·4	7·5	53·3	11·0

ANOVA significant effects: None

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since the whole passage is visible. The raters in this experiment were students, and it may be that they were more adept than the raters in at least some previous studies at making use of following context, and so were able to compensate for what were perhaps genuine difficulties in predicting schizophrenic speech. To test this possibility, a modified form of presentation, which prevented raters using all but preceding context, was devised and was incorporated in a second experiment.

Experiment 2

Hypotheses

The second experiment tested the hypotheses that:

(1) Schizophrenic speech would be less predictable than normal speech.

(2) The difference between schizophrenic and normal speech would be greater when the text following a blank was obscured than when the whole passage was visible.

(3) The difference between schizophrenic and normal speech would be greater under fourth-word deletion than fifth-word deletion.

Method

Materials and raters. The material consisted of the passages used in the first experiment, and the raters were 20 science undergraduates, none of whom was reading Psychology or had taken part in any similar experiment. The passages were typed in such a way that each line consisted of three words followed by a blank (fourth-word deletion) or four words followed by a blank (fifth-word deletion).

Procedure. Each rater was randomly assigned to either the 'Whole Context' condition or the 'Preceding Context' condition. In the 'Whole Context' condition the material was presented in the traditional way, and the whole passage was visible. In the 'Preceding Context' condition, the passage was covered with a card and one line was revealed at a time so that the rater could see everything which preceded a blank but none of the text which followed it. Each line was revealed only after the preceding blank had been filled. Raters in both conditions were supervized by one of the experimenters and were asked to 'Cloze' four different passages: one schizophrenic passage under fourth-word deletion (D_4) and one under fifth-word deletion (D_5); and one normal passage under D_4 and one under D_5. They were told only that the passages were taken from 'hospital patients' in an 'interview', and they were presented with their four passages in random order. Thus the design was such that each of the 20 passages was 'Clozed' once in the 'Whole Context' condition under D_4 and once under D_5, and once in the 'Preceding Context' condition under D_4 and once under D_5.

Results

Cloze Scores were calculated separately for the first and second 100 words of each passage, and the factors, 'Context condition' (Whole/Preceding), 'Material' (Schizophrenic/Normal), 'Deletion Pattern' (D_4/D_5), and 'Parts' (Part I/Part II) were examined by analysis of variance with repeated measures on the last three factors (Winer, 1970, page 349). Means and a summary of the analysis are given in Table II. None of the three hypotheses was supported: there was no significant difference between schizophrenic and normal speech ($F = 2{\cdot}3$; df 1, 18; $P > {\cdot}10$), and no interaction between either Material and Context condition ($F = 0{\cdot}4$; df 1, 18; $P > {\cdot}10$) or Material and Deletion pattern ($F = 0{\cdot}0$; df 1, 18; $P > {\cdot}10$). The only significant effects indicated that the Preceding Context condition produced very much lower scores than the Whole Context condition uniformly for both types of mateiral; and, for schizophrenic material, the second 100 words was more predictable than the first 100, while the opposite was true for normal material, a finding which was especially marked under fifth-word deletion.

The main purpose of this experiment was to test whether the results of the first experiment could have been due to the raters' skill at using following context. The suggestion received no support, since under the new form of presentation, just as in the traditional procedure, no difference was found between schizophrenic and normal speech. The effect of the new condition was simply to produce a very difficult task, irrespective of the type of material. It is interest-

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TABLE II

Experiment 2: Mean Cloze scores

	Schizophrenic								Normal							
	D_4				D_5				D_4				D_5			
	I		II		I		II		I		II		I		II	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Whole ..	44·8	13·7	45·2	18·7	40·0	12·0	55·0	16·5	53·2	11·2	47·2	11·6	54·0	16·3	45·5	6·9
Preceding ..	18·8	8·4	20·0	10·5	18·0	6·7	26·0	9·4	20·8	6·2	24·4	8·1	21·0	3·9	22·5	7·2

ANOVA significant effects: W/P $F = 181{\cdot}4$; df 1, 18; $P < {\cdot}001$
$S/N \times I/II$ $F = 5{\cdot}8$; df 1, 18; $P < {\cdot}05$
$S/N \times D_4/D_5 \times I/II$ $F = 5{\cdot}6$; df 1, 18; $P < {\cdot}05$

ing to note, in addition, that Silverman's suggestion that fourth-word deletion produces a particularly marked difference between schizophrenic and normal speech once again received no support, while Salzinger's suggestion that schizophrenic speech becomes progressively less predictable as the passage continues was actually reversed.

Discussion

The literature abounds with inconsistent findings: while some writers suggest that schizophrenic speech is less predictable than normal speech, this and several previous investigations have found no difference. The most likely interpretation is that methodological factors are responsible; but if so, the phenomenon lacks robustness and can be of little intrinsic interest. Two particular points of detail deserve comment. The first is that no standard procedure for collecting speech samples has been adopted, with the result that writers have used a wide variety of topics, experimenters and settings. Until such variables are manipulated systematically, we shall not know their possible effects, and the interpretation of findings will continue to be hazardous. The second point concerns the selection and description of speakers. Sample sizes have typically been small, selection criteria have seldom been made explicit, and many different types of control group have been used. Diagnostic criteria, in particular, are likely to vary across experiments, and the possible difference between this investigation and American work has already been noted. While the difference was inconsequential here, in that it would have exaggerated rather than diminished any difference between the schizophrenic and normal samples, diagnostic variations may sometimes make interpretation difficult.

Despite the discrepancies in the existing literature, future research may yet identify some group of schizophrenic patients who do reliably produce speech which is less predictable than normal speech. The important question then would be what it was about their speech which made it difficult to predict, and in particular whether semantic or structural properties were implicated. One way of approaching this question would be to examine the errors which raters made during Cloze Procedure. Two preliminary analyses of this sort were conducted on the present data, and, although neither revealed any difference between schizophrenic and normal material (as was to be expected since Cloze Procedure had revealed no differences in predictability), both procedures will be outlined since they may be useful in future research.

The first analysis examines the type of error the rater makes at any given blank. Each error is classified as either a semantic error or structural error. A semantic error is one in which the rater correctly identifies the part of speech, but chooses the wrong instance of that part of speech. For example, he chooses a noun, but the wrong noun. A structural error is one in which the rater records the wrong part of

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speech. For example, he might record a noun when an adjective or verb had been used. The analysis is based on the assumption that semantic errors signify semantic abnormality in the passage and structural errors signify syntactic or grammatical abnormality.

The second analysis examines the class of word on which the rater makes an error. Each deleted word is classified according to Fries' system (Fries, 1952) as a 'content' word or a 'function' word. Broadly, content words are nouns, verbs, adverbs and adjectives, and function words are all the remaining parts of speech. The analysis is based on the assumption that the more content words on which errors are made the greater the semantic abnormality in the passage, and the more function words on which errors are made the greater the syntactic or grammatical abnormality. The procedure, like the first analysis, is simple to apply and will, it is hoped, elicit valuable data.

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