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Language Structure and Predictability in Overinclusive Patients

By D. S. HART and R. W. PAYNE

Deviant language behaviour is the primary basis for the clinical inference of thought disorder. Bleuler (1950), for example, emphasizes loose associations and disjointed utterances. Mayer-Gross, Slater, and Roth (1960) state that thought disorder is indicated by such conversation characteristics as 'woolly vagueness', inconsequential following of side issues, direction by alliteration, analogies or clang associations, and the use of words out of context. However, psychological studies have typically used measures of disordered thinking derived from performance on categorization tasks. Such tasks do not obviously measure the abnormality which is definitive for the clinician. The study reported here was an attempt to relate measures of language effectiveness to overinclusive thought disorder.

The initial problem is the choice of which aspect of language is to be measured. From the detailed clinical descriptions, such as those referred to above, the speech of the thought-disordered person may be said to be characterized by imprecise and idiosyncratic use of both the words and the structure of language. Woods (1938), for example, having studied stenographic records of conversations, described the language of schizophrenics as being often formally correct but as frequently including vague, incompletely formulated phrases, eccentric usage and condensation, metaphorical descriptions with a lack of precision, and in some cases a mere stereotyped repetition of words. The features which Cameron (1938) found in the sentence completions of thought-disordered patients were: a lack of connectives, a lack of precise terms, the inclusion of fragments of unrelated themes, and varied generalizations used to describe performance but which inadequately corresponded with the behaviour.

Since excessively imprecise language has been identified with thought disorder, and since a number of studies have characterized schizophrenic thought disorder as an abnormal tendency to use overinclusive concepts (Payne, 1961), it was hypothesized that patients characterized by abnormal overinclusion scores would produce conversational speech which could be differentiated from that of other patients by measures of precision.

Precision in speech was assumed to be, at least in part, a function of judicious selection of words and of careful elaboration by means of qualifying words. Thus it was expected that the lessened precision of overinclusive subjects would be reflected in their use of a relatively low variety of words and in relatively low proportions of qualifying words (adverbs and adjectives).

There is some evidence that the structure of the language of schizophrenic patients is deviant. Fairbanks (1944), Mann (1944), and Seth and Beloff (1959) found lower type-token ratios (word variety) for samples of schizophrenic speech compared to those of other groups, although Feldstein and Jaffe (1962), and Hammer and Salzinger (1964) failed to replicate this finding. Parts of speech differences reported by Fairbanks (1944) were: lower proportionate use of nouns, articles, prepositions and adjectives, with greater use of verbs, pronouns and interjections, by schizophrenic patients than by college students. However, neither Mann (1944) nor Lorenz and Cobb (1954) were able to confirm the parts of speech differences.

Following Payne and Hewlett's (1960) suggestion that schizophrenic patients tend to be either overinclusive or psychomotor-retarded, it was predicted that slow rate of speech would be associated with retardation but would not differentiate overinclusive subjects from other groups.

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Method

Subjects

The 73 subjects who provided the data reported here were of a group of 100 patients most of whom were consecutive new admissions to the Kingston Psychiatric Hospital, Kingston, Ontario. The only new admissions not included were those: (a) already medicated; (b) of age 65 or over; (c) having vocabulary IQ less than 80, or (d) having symptoms known to be the result of brain injury or chronic alcoholism. New admissions to the Kingston General Hospital were also included if they satisfied the requirements and if they were intended for treatment with phenothiazine medication, since it was in this category that patients were most often lost to study because of being on medication from the time of admission. The group consisted of 40 female and 33 male patients whose final diagnoses, and means of age, IQ, and Occupational Status (Hollingshead and Redlich, 1958) measures are summarized in Table I. None of the group differences were significant, except that the Depressed group had a mean age greater than all except the Schizophrenic (Paranoid) group (Duncan's Multiple Range Test, $s_e = 10{\cdot}40$, $p < {\cdot}05$). One patient is not included in the diagnostic group summary; his diagnosis was 'toxic psychosis secondary to ingestion of toxic materials'.

Procedure

Language samples were obtained by having each subject talk about how he happened to come to the hospital. The tape recorder was in view of the subject. The aim was to obtain at least 500 words of continuous free speech, the course of which was directed entirely by the subject. For most patients prompting was required to elicit a sufficiently long sample. Verbal prompts were restricted to requests to continue, and were only given when a pause had lasted for more than 20 seconds.

Pilot work using the Thematic Apperception Test cards and the Shneidman Make A Picture Story Test (Shneidman, 1948) resulted in stories much too short for useful analysis, and their use was discontinued.

Overinclusive thought disorder was measured by scores obtained on the Payne Object Classification Test, the Goldstein Object Sorting Test, and the Benjamin Proverbs Test, the description and administration for each of which is given in Payne and Friedlander (1962). Psychomotor retardation was assessed by: (a) three of the Babcock and Levy (1940) measures—time to write own name, time to write 'the United States of America', and time to write the sentence 'I hope to leave here very soon'; (b) the Three Squares Test (Eysenck, 1952); and (c) the Manual and Finger Dexterity Tests (United States Employment Service, 1955).

The Mill Hill Vocabulary Test (Raven, 1948) was always administered first, since it was used to screen subjects. The order of administering other tests was varied so that order effects were balanced. All testing was completed as soon as possible after the patient had been admitted to hospital. No specific treatment was commenced until the testing was finished. In addition, the psychiatrist assigned to the patient rated the clinical symptoms on a standard psychiatric rating scale developed by the Departments of Psychology and Psychiatry of Queen's University. (The authors will provide a copy of the Psychiatric Symptom Rating Scale upon request.) The whole procedure was repeated six weeks after the initial testing to provide an assessment of treatment effects.

Language analysis

The tape-recorded conversation samples were transcribed by a typist and then E compared them with the transcripts to ensure fidelity. Words were defined primarily by the process of transcription: a word is a group of letters not containing a space but

Table I
Group characteristics of patient sample

Group	n	Vocabulary IQ		Occupational status		Age	
		Mean	s.d.	Mean	s.d.	Mean	s.d.
Total sample	73	92·0	9·50	4·6	1·4	34·5	10·8
Schiz. (paranoid) ..	26	92·7	12·87	4·3	1·4	37·6	8·32
Schiz. (other)	14	91·6	9·54	5·1	1·3	31·1	11·3
Depressed	9	90·4	9·61	4·5	1·7	44·3	7·58
Manic	5	90·0	7·18	3·8	0·75	26·6	4·44
Neurotic	8	91·9	8·24	4·4	1·2	28·6	8·43
Path. personality ..	10	94·0	6·39	5·5	1·6	32·5	15·7

Note: Group differences are not significant ($p < {\cdot}05$) except that the depressed group had a mean age greater than all but the Schizophrenic (paranoid) group (Duncan's Multiple Range test, $S_e = 10{\cdot}40$).

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which is preceded by and followed by a space, and which corresponds to a word listed in a dictionary or which occurs in constructions such that it can be assigned to a substitution class in the manner to be described. By this definition colloquialisms and neologisms were not excluded, but letter groups such as 'ah', 'uh', and 'um' were.

The index of word variety was the Type-Token Ratio, which is the ratio of the number of different words (types) in a sample to the total number of words (tokens) occurring in that sample.

Assignments of words to word-classes was done by E using the formal procedures developed by the linguist Harris (1951). Briefly, words are assigned to the same class if their occurrence is such that they can substitute for one another to produce utterances acceptable to native speakers of the language. Following Harris, the five word-classes were labelled N, V, A, D and F, since to a considerable extent they correspond to Nouns, Verbs, Adjectives, Adverbs, and Function words of the familiar traditional definitions. In this report the traditional word-class names have been used to facilitate reading, but it should be noted that the use of substitution procedures yields classifications which do not correspond to the traditional categorizations. Parts of speech classification by traditional definitions was not done, because these are inconsistent, confuse functional and semantic criteria, and do not permit rigorous, objective application.

All of the language measures were made on the first 500 words of the conversation samples. Chatlos (1944) found that, for written material, 500-word Type-Token Ratios correlated ·925 with those from 3,000-word segments from which they had been taken, suggesting that the 500-word sample size is representative of an individual's language behaviour in a given situation. The deciding factor, however, was the difficulty in getting subjects to produce more than 500 words of continuous free speech. As it was, 25 patients' samples could not be included because of insufficient length.

Speech Rate, in words per minute, was based on the duration, measured by stopwatch to the nearest second, from the subject's first recorded word of the sample to the completion of the fifth minute of the sample.

The scores derived from the language samples were: 500-word Type-Token Ratio; Noun, Verb, Adjective, and Adverb Type-Token Ratios; proportion of words in the sample assigned to Noun, Verb, Adjective, Adverb, and Function word classes; and Speech Rate.

The reliability of the word classification procedure was determined by performing second analyses on ten conversations at intervals of between two and four days. Product-moment correlations between the two sets of counts ranged between ·99 and ·86; only one of the eleven was below ·90.

A comparison was made between the standard interview procedure and another, less restrictive, by which each of 16 patients was informed that the recording was being made for a study of speech and that the speech sample could be on any topic. The 16 subjects were matched for age, sex, and vocabulary IQ with 16 patients whose conversations had been obtained using the standard procedure. Comparisons of the means of each of the 12 measures listed above revealed no significant differences (t test, $p < ·05$). Apparently the conversation characteristics measured are not peculiar to the method by which they are obtained.

Five subjects had conversations recorded by both a female graduate student and by E, both using the same procedure. Two patients were interviewed first by E, and the other three he interviewed second. For the means of the 12 language measures none of the differences between the two sets of interviews were significant (t test, $p < ·05$). The sample is small, but the result affords some confidence that the language data obtained are not peculiar to E.

Results

Overinclusion and retardation measures

The expected strong correlations among the three measures of overinclusive thinking did not occur. This result has been reported in detail by Payne, Hawks, Friedlander and Hart (1972), and its implications for the usefulness of the concept of overinclusive thought disorder have been discussed in a review by Payne (1971). The intercorrelations of the measures of psychomotor retardation were similarly weak. Consequently it was not reasonable to make the planned comparisons between patients grouped according to their combined scores on either the tests of overinclusive thinking or the tests of psychomotor retardation. The subsequent analysis is primarily a report of correlational analysis.

Language measures

The language measures were found to be relatively independent of the personal characteristics measured. Word variety, as measured by the 500-word Type-Token Ratio, correlated with the Vocabulary Raw Score ($r = ·28$) but insignificantly with the IQ derived from it and with Age; it was also significantly corre-

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lated with Years of Education (r = ·24) and with Occupational Status (r = ·23). Except for Adverb proportion with Occupational Status (r = ·29), none of the word class proportions was found to be related to any of the personal measures; nor was Speech Rate so related.

The intercorrelations of the language measures revealed that large Type-Token Ratio (word variety) of conversation was associated with low proportionate use of Verbs (r = −·38) and high proportionate use of Adjectives (r = ·31). High proportionate use of Adjectives tended to occur in conversations having low proportions of Verbs (r = −·43) and of Nouns (r = −·24). Word variety in speech is apparently associated with word knowledge (vocabulary raw score and years of education) and with descriptiveness (use of adjectives).

Language as a function of Overinclusion and Retardation

The frequency of reliable correlations between the language measures and the measures of overinclusive thinking was just that expected by chance; there is no support from them for the hypothesis that patients characterized by abnormal overinclusion scores can be differentiated by the language measures obtained. Neither were there any significant correlations between measures of word variety and of word class use and measures of psychomotor retardation. Speech Rate was found to be related to the Babcock-Levy 'time to write a sentence' (r = −·21) and to the USES Manual and Finger Dexterity Test score (r = ·34), but not reliably to the other measures of retardation.

Language and Psychiatric Symptom Ratings

Some support for the hypothesis was found in the correlations computed for language measures and Psychiatric Symptom Ratings. The symptom 'disordered thinking' was related to high Adjective and high Adverb Type-Token Ratios, to low Adverb proportion and to high Noun proportion (see Table II).

These same language measures were found also to be related to several other symptoms associated with clinical thought disorder as listed in Table II. However, the predicted correlations between thought disorder symptoms and the 500-word Type-Token Ratio or the proportionate use of Adjectives were insignificant.

As expected, Speech Rate was inversely correlated with ratings of symptoms associated with psychomotor retardation: 'motor activity', 'speech activity', 'speed of thought', 'drive', 'elevation—depression of feelings', and 'grandiose—depreciative delusions' (see Table III). Some of these symptom ratings were also associated with low word variety: the 500-word Type-Token Ratio correlated with 'speech activity' (r = −·35), and 'drive' (r = −·35); the Noun Type-Token Ratio with 'speech activity' (r = −·27) and 'drive' (r = −·23); and the Adverb Type-Token Ratio with 'gradiose—depreciative delusions' (r = −·31).

Psychiatric group comparisons

Comparisons between the means of the language measures (Duncan's Multiple Range Test) of the six psychiatric groups revealed that the two Schizophrenic groups are not differentiated from the other groups (see Table IV). The Manic group, however, had a mean 500-word Type-Token Ratio significantly greater than any of the other groups except for the Neurotic, which difference fell just short of that needed to meet the ·05 criterion.

TABLE II

Correlations between language measures and psychiatric symptom ratings associated with thought disorder
(n = 73)

Language measure	Symptom	Correlation ($p < ·05$)
Adjective TTR	'disordered thinking'	·27
Adverb TTR	'disordered thinking'	·19
	'visual misperceptions'	·26
Noun %	'disordered thinking'	·24
	'appropriateness of feeling'	·29
	'Persecutory delusions'	·22
Adverb %	'disordered thinking'	−·26
	'appropriateness of feeling'	−·19
	'persecutory delusions'	−·19
	'visual misperceptions'	−·20
	'ideas of reference'	−·23
	'hypochondriacal delusions'	−·34

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TABLE III

Correlations between speech rate (words per minute) and psychiatric symptom ratings associated with psychomotor retardation

(n = 73)

Symptom	Correlation ($p < .05$)
'motor activity'	−·51
'speech activity'	−·50
'speed of thought'	−·43
'drive'	−·38
'elevation—depression of feelings'	−·28
'grandiose—depreciative delusions'	−·24

Note: The inverse correlations indicate that *low* Speech Rate was associated with rated low motor and speech activity, slow speed of thought, low drive, depression of feelings, and depreciative delusions.

Language change with treatment

Treatments were assigned to patients according to the normal hospital procedures, except in the case of a small group. Ten patients, selected because phenothiazine medication was considered appropriate for them, were included in a study of the effects of Proketazine (Payne, Friedlander, Laverty and Haden, 1963); six were given the active medication and four the placebo. Of the 50 patients whose retest data were complete, 28 had been treated with phenothiazines (including the Proketazine six mentioned above), 7 with anti-depressant medication, 9 had been given no medication, and 4 had been assigned placebos as noted above.

It had been expected that the predicted language characteristics of thought-disordered subjects would become less deviant as an effect of phenothiazine medication. However, the only significant treatment effects were unpredicted (see Table V). The antidepressant group changed in word class use, and the phenothiazine group changed in Speech Rate.

Prognostic value of language measures

Had the language measures differentiated a group of thought-disordered patients, it had been expected that they would be shown to be predictive of remission of thought-disorder symptoms following the six-week treatment period. However, with the exception of Speech Rate, measures derived from the language samples were not related in any systematic manner to changes in symptom ratings. High initial Speech Rate was associated with improvement in ratings of the retardation symptoms 'drive' ($r = .34$), 'speech activity' ($r = .33$), and 'depreciative delusions' ($r = .27$).

DISCUSSION

The weight of the evidence is against the hypothesized relationship between overinclusive thinking and deviance in language structure. Indeed, language structure as measured in this study appears to be a stable personal characteristic independent of psychological abnormality and psychiatric treatment.

Such predictions as were confirmed indicated that patients who were rated clinically as suffering from 'disordered thinking' tended to have some of the language deviations expected of overinclusive subjects (higher Noun and lower Adverb proportions, greater variety of Adjectives and Adverbs). Without the corroborative correlations with the 500-word Type-Token Ratio and the Adjective proportion it cannot be suggested that the clinician was detecting 'imprecision' of language as defined for the study. However, it appears that the

TABLE IV

Means of 500-word type-token ratios for subjects grouped by psychiatric diagnosis

Group	n	Mean TTR	s.d.	Significant comparison*	Difference	Least significant range
Manic	5	·366	·0353	M v S.(P.)	·034	·0310
Neurotic	8	·333	·0303	M v. P.P.	·045	·0361
Schiz. (paranoid)	26	·332	·0326	M v S.(O.)	·046	·0350
Path. personality	10	·321	·0187	M v D.	·047	·0381
Schiz. (other)	14	·320	·0320	(M v N.)	(·033)	(·0345)
Depressed	9	·319	·0262			

* Duncan's Multiple Range test, $s_e = 0{\cdot}03027$, $p < .05$.

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TABLE V

Significant ($p < .05$) changes in language measures of treatment groups

Treatment	n	Measure	Initial		Retest		t
			Mean	s.d.	Mean	s.d.	
Anti-depressant..	7	Verb %	18·7	1·37	20·0	1·78	3·82
		Adverb %	2·14	0·77	3·21	1·16	4·15
		Function word %	41·2	2·26	38·5	2·78	2·51
Phenothiazine ..	36	Speech rate	108·3	45·24	128·9	41·48	2·85
No treatment ..	9	Speech rate	130·3	30·32	124·7	35·31	0·42
Placebo	4	Speech rate	94·3	31·08	88·3	7·65	0·32

clinicians were rating behaviour associated with small variations in the language structure, possibly too small to be of practical value.

Speech Rate had been expected to be simply another measure of psychomotor retardation, but the findings suggest it may prove to have considerable value. It correlated well with measures of psychomotor speed and with psychiatric ratings of retardation symptoms. Although the differences between psychiatric ratings were not statistically reliable, the combined treatments group was found to have a significantly increased Speech Rate, a result significant among the treatment subgroups only for those having phenothiazine medication. High initial Speech Rate was found to be predictive of improvement on retardation symptoms. Rate of speaking thus appears to have potential value in clinical assessment; it is particularly attractive for clinical work, since Speech Rate is usually measurable even when other measures are not possible.

Since the evidence weighed against the hypothesis that language structure differences characterize thought-disordered patients, it was decided to examine the logically prior question: do thought-disordered patients produce speech which is less communicative than that of other subjects?

AN ADDITIONAL INVESTIGATION

Taylor (1953) developed a procedure known as the 'cloze' technique for the measurement of readability. Originally a tool for journalism, the wide usefulness of the cloze technique as a measure of communicability was quickly appreciated and applied (Taylor, 1956). The procedure involves the systematic deletion of words from a language sample followed by the guessing of the deleted words by a group of judges. The correspondence between the deleted and the guessed words affords the measure of the communicability of the passage.

Salzinger, Portnoy, and Feldman (1964, 1966) reported cloze comparisons of speech samples from 13 matched pairs of schizophrenic and non-psychiatric patients. Twelve of the schizophrenic patients had lower communicability scores than their control subjects. In addition, most of the schizophrenic samples were found to decrease in comprehensibility from the first 100-word segment to the second while the normal subjects tended to increase.

It was decided to use the cloze procedure to study language samples obtained in the present investigation in order to test the hypothesis that the language samples of patients having high overinclusion scores would be less comprehensible than those of matched non-overinclusive patients.

METHOD

Subjects

Of the 73 acute psychiatric patients of the initial study, 12 were found to have at least two abnormal scores (using data given in Payne and Friedlander, 1964) on the three tests of overinclusive thought disorder. These 'overinclusive' patients were matched in pairs for sex, age, vocabulary IQ, occupational status and years of education with other patients in the sample, all of whom had overinclusion scores within the range of normals reported by Payne and Friedlander (1962). Matching data and overinclusion test scores are shown in Table VI. Two matching subjects were used twice because other reasonable matches were not available in the sample. Psychi-

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atric diagnosis was not considered in the selection, but it and the rating on 'disordered thinking' for each patient are included in the table.

Procedure

The initial 500 words of free conversation recorded from each of the subjects were prepared for cloze study by the preparation of new typescripts having a blank in place of every fifth word and by having all punctuation marks and all identifying words removed. Where a fifth word was a 'proper noun' or a numeral the following word was deleted and the whole passage continued, so that each sample contained 100 blanks with four words preceding and four words following each blank.

The passages so prepared were mimeographed and presented in pairs as indicated in Table VI. The order of presentation was reversed for one half of the judges. The mimeographed pairs of mutilated speech samples were distributed to groups of university students with the instruction to guess the words which had been used in the blank spaces; the students were also informed that the samples were of continuous speech by mental hospital patients. In this way each pair of language samples was completed by 20 students. The communicability measure for a language sample was the mean number of guessed words which corresponded exactly with the word which had been originally recorded. Scores were only used if the judge had completed both samples of a pair, so that mean differences in correctness scores were not influenced by differences between students in their ability to guess missing words.

Results

For each matched pair average correctness scores were compared (A test, McGuigan, 1960). The overinclusive subjects had significantly ($p < \cdot001$) lower scores in ten of the twelve pairs (see Fig. 1). Of the other two comparisons one was in the opposite direction ($p < \cdot05$) and the second was an insignificant difference.

Correctness scores for the first 100 words (ten blanks) were compared with those for the fifth 100 words of each sample. For the overinclusive subjects, nine of the twelve passages showed significant decreases in predictability (A test, $p < \cdot05$), while only two of the non-overinclusive passages revealed significant declines (see Fig. 2).

The Type-Token Ratios of the overinclusive subjects were compared with those of the matched non-overinclusive subjects (see Table VI). The group means were almost identical.

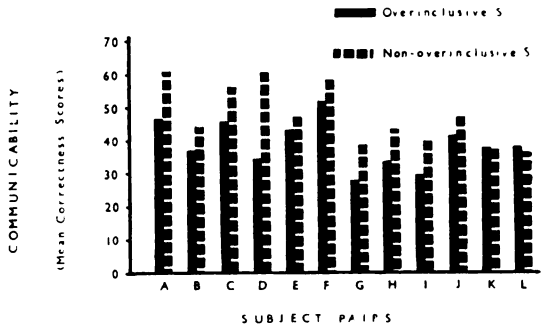


FIG. 1.—Communicability (mean correctness scores) of conversations from matched Overinclusive and Non-overinclusive pairs of psychiatric patients. Differences are significant except for pairs K and L (A test, $p < \cdot001$).

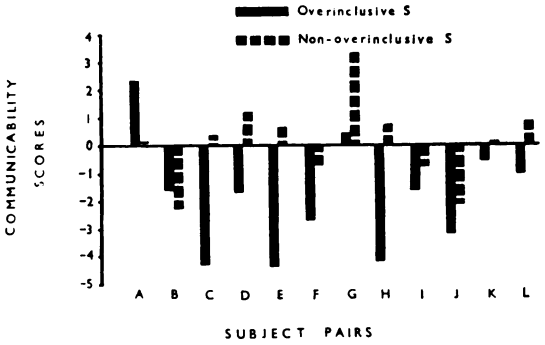


FIG. 2.—Change in Communicability (mean correctness scores) between first and fifth 100-word segments of conversations from Overinclusive and Non-overinclusive patients matched in pairs. Overinclusive S decreases were significant except in pairs A, G, and K; the only Non-overinclusive S decreases were in pairs B and J ($p < \cdot05$, A test).

Discussion

The cloze procedure results clearly support the hypothesized relation between overinclusive thought disorder and deficient communicability. There was also corroboration of Salzinger, Portnoy and Feldman's (1964) finding of decreasing communicability during the course of conversation, a phenomenon evidently more associated with overinclusive thought disorder than with diagnosis of schizophrenia. Deviant language, long the basis of clinical assessment of thought disorder, is thus shown to be related to psychological measures of disordered thinking. The results presented in the initial investiga-

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TABLE VI

Overinclusion scores, matching data, psychiatric diagnosis, and 500-word type-token ratios of subjects in communicability study

	Pair	Overinclusion scores			Matching data				Diagnosis	TTR
		Payne 'non-A'	Goldstein 'handing over'	Proverbs 'words'	Age	Education	IQ	Occupational status		
A	O*	9	11·3	30·1	29	7	80	7	Sc(P)	·290
	Non-O*	0	7·5	18·5	28	7	86	7	M-D(D)	·312
B	O	10	14·0	29·9	31	8	89	6	Sc(Chr)	·303
	Non-O	0	4·0	8·3	29	7	86	5	Sc(P)	·332
C	O	13	15·5	25·9	18	13	118	2	Sc	·314
	Non-O	1	5·3	32·3	19	13	109	3	D	·325
D	O	8	18·3	122·8	20	14	99	3	Hy	·347
	Non-O	2	4·0	35·7	20	14	100	3	PathPers	·350
E	O	9	3·8	49·1	30	16	86	3	M-D(M)	·326
	Non-O	8	6·0	17·4	47	16	86	4	Sc(P)	·298
F	O	10	6·3	71·8	26	9	94	5	PathPers	·342
	Non-O	1	4·8	14·5	25	9	84	5	N(Mixed)	·342
G	O	9	34·0	6·7	41	12	89	4	Sc(Cat)	·386
	Non-O	5	3·0	217·3	44	12	84	3	ParPers	·334
H	O	8	6·8	6·7	29	8	84	6	Sc(Cat)	·287
	Non-O	3	5·0	14·2	29	8	98	7	ScPers	·316
I	O	8	11·8	13·7	27	11	82	3	M-D(M)	·331
	Non-O	0	5·0	20·0	30	11	87	4	M-D(M)	·378
J	O	4	25·0	121·9	32	11	87	5	Sc(Cat)	·331
	Non-O	0	5·0	20·0	30	11	87	4	M-D(M)	·378
K	O	14	5·5	43·5	41	10	89	4	ParPers	·334
	Non-O	1	7·0	20·3	37	10	84	6	N(D)	·282
L	O	11	4·0	94·6	46	10	98	6	Sc(P)	·320
	Non-O	1	7·0	20·3	37	10	84	6	N(D)	·282

Note: In pairs J and L the Non-O control is the same subject as used for the previous pair.
* O = Overinclusive subject, Non-O = Non-Overinclusive subject.

tion suggest that the nature of the language deviance is not to be found in such measures of language structure. In addition, the failure to replicate convincing intercorrelations among overinclusion tests undermines the value of overinclusion theory for explaining the language dysfunction.

Current thinking about generative grammars (Chomsky, 1968) and the psycholinguistic research related to it (e.g. Miller, 1967) is consistent with the notion that language is produced by a hierarchical set of imbedded feedback control mechanisms, such as described by Miller, Galanter, and Pribram (1960) as a model for sequential behaviour. The occurrence of a weakening of the 'Test' phase of such feedback control loops at a higher level of the hierarchy (e.g. testing for congruence with initial object of the utterance) is a condition for impoverished predictability in language and in categorization tasks. Unfortunately there are no direct measures of the action of the hypo-

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thesized Test phase of the control loop which would permit the assessment of this speculation.

Another approach is suggested by the non-overinclusive control subject who was the match in both cases of failure to obtain the predicted difference in communicability of the 500-word sample (in one of these cases the predicted difference was found for the fifth 100-word segment). He was an extremely tense, worried person, who apparently fitted the characteristics of a person at the developing phase of Mednick's (1958) supposed effects of prolonged over-arousal. Overarousal may produce its effect on performance through reducing the extent of control by initial conversational aim or task instructions, the initial stimulus conditions in Salzinger's account (Salzinger, Portnoy, and Feldman, 1964). Alternatively, high arousal level may produce a high level of distractions analogous to those experimentally produced by Hassol, Magaret and Cameron, (1952), which they found were conditions for 'scattered' speech such as had been reported for thought-disordered schizophrenic subjects (Cameron, 1938, 1939).

The finding (details of which have been omitted in this report) that the overinclusion test scores tended to have inverse correlations with retardation symptom ratings, particularly 'speech activity', were taken to suggest a dimension of 'responsiveness' (Hart, 1965). The notion is similar to those discussed above, but implies that the extreme opposite to 'overresponsiveness' is 'underresponsiveness' with characteristics of psychomotor retardation and possibly 'under-arousability'. Hawks and Marshall (1971) developed a similar hypothesis which they confirmed with a demonstration that overinclusive subjects obtain reduced overinclusion scores when their rate of responding is decreased and that psychomotor retarded subjects obtain increased over-inclusion scores when their response rate is increased.

Thus, although satisfactory defining measures have so far proved elusive, there is a convergence in the speculations accompanying studies of thought disorder. The results of the present study raise the hope that measures of language predictability will provide clues to more fruitful research on thought disorder.

Summary

At their admission to hospital, 73 acute psychiatric patients were tested for Over-inclusive Thought Disorder and Psychomotor Retardation, had 500-word continuous language samples recorded, and had their psychiatric symptoms rated, the whole procedure being repeated after six weeks of treatment. Unexpectedly, the overinclusion and retardation scores failed to intercorrelate as had been the case in previous studies. The hypothesized relationship between overinclusion and precision in language was not confirmed, although there was some evidence for an association between language deviance and ratings of 'disordered thinking'. The weight of the evidence favoured stability of language structure irrespective of psychological abnormalities and psychiatric treatment.

Speech Rate was found to be correlated with measures and ratings of retardation, to be increased following treatment by phenothiazine medication, and to be predictive of remission of retardation symptoms.

The language sample of 12 patients who had at least two abnormal overinclusion scores were compared with matched non-overinclusive patients, using the 'cloze' technique to measure communicability. The results clearly support the hypothesized relationship between deficient language predictability and overinclusive thinking.

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