REPETITION IN SCHIZOPHRENIC SPEECH*

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Previous research on language with the Type–Token Ratio (TTR) indicates an increased repetitiousness in schizophrenics, specifically in thought-disordered schizophrenics. The present investigation involves an analysis of oral language samples utilizing a variety of repetition measures. Subjects were 40 schizophrenics, 20 affective disorder controls and 22 normal controls. Phrase repetitions were found to be more prevalent among the schizophrenic group, and especially among the TD subgroup, and indices of phrase repetition were positively correlated with dimensions of formal thought disorder. The frequency patterns of repeated words in schizophrenic language reflect a less common, but not unusual lexicon compared to controls, thereby supporting the view that word repetition in schizophrenic utterance is not a consequence of a restricted vocabulary range. The intervals between phrase repetitions were not different for schizophrenics and controls, indicating that simple perseveration is also not a likely explanation. Rather, repetitiousness, a major characteristic of schizophrenic speech, may be due to a unique, yet undetermined mechanism responsible for the language disturbances seen in this disorder.

INTRODUCTION

Disorders of psychological function that include a substantial component of language disturbance offer a valuable opportunity to detect the mechanisms that may underlie the production of normal utterances. The process is laborious and involves the development of reliable methods for the definition and quantification of anomalies. Without such techniques it is impossible to perform the statistical analyses that we need to ensure that anomalies (and the mechanisms that mediate them) that appear to be independent of each other clinically are independent of each other in fact.

Schizophrenia is a disorder that is commonly accompanied by significant disturbances of language. Bleuler (1950) in one of the classic descriptions of the disorder regarded the anomalies of language as an essential element in the diagnosis of schizophrenia, suggesting that they are an integral element in the disorder of thought that is a fundamental pathology in this disease. His work has been influential in determining the direction of research into the linguistic and cognitive processes of these patients (Harvey

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and Neale, 1983). A central assumption of Bleuler's thesis is that the disturbances of utterance reflect a more basic disturbance of thinking, with the concomitant implication that the severity of the measured disturbance of language should correlate with other indices of thought disorder.

A serious obstacle to the progress of work on this problem has been the lack of clear operationally specific definitions of the anomalies themselves, commonly leaving the task of measuring them to crude ratings based upon clinical impressions. One consequence of this is that studies of schizophrenic utterance often fail to replicate each other. Given the built-in limitations of listeners' impressions as a method of measurement of language phenomena, it seems clear that further progress is likely to be dependent upon the use of quantification rather than clinical judgment.

Bleuler observed that the speech of many schizophrenic patients seemed to be marked by a high degree of repetitiousness in linguistic elements. Clinical examples of repetition in schizophrenic utterance include such instances as: "Send it to me, Joseph Nemo, in care of Joseph Nemo and me who answers by the name of Joseph Nemo and will care for it myself. Thanks everlasting and Merry New Year to Mentholatum Company for my nose, for my nose, for my nose, for my nose, for my nose" (Maher, 1968).

This is a feature of utterance that has lent itself to some rather obvious forms of measurement. One of the most common measures of repetition is the type–token ratio (TTR). It consists simply of the ratio of the total number of different words in the passage, divided by the total number of all words. Thus a passage in which no word ever appeared more than once would achieve a ratio of 1.00. The greater the number of repetitions of words, the more the ratio would decline below that value. Wendell Johnson (1944) employed the TTR in the quantification of speech dysfunction on non-psychiatric origin, and Fairbanks (1944) and Mann (1944) first used it to study repetition in schizophrenic utterance.

A thorough review of studies that have employed this technique in research into schizophrenic utterance is to be found in Cozolino (1983). Fourteen studies were reviewed. Differences in the way in which the diagnosis of schizophrenia was made and differences in the language samples (oral versus written utterances), make it difficult to draw firm conclusions from this review. The general tenor of the findings is, however, that schizophrenic patients do tend to have lower TTR values than do comparison groups of normal or psychiatric non-schizophrenic subjects, i.e., that schizophrenic patients are more repetitious.

A major limitation of the TTR is that it assumes that the processes that produce repetition operate with single words as relevant units. In view of the fact that the repetitions actually observed often consist of repeated phrases it is likely that the TTR is relatively insensitive to them. Thus the bizarre quality of the repetition of "for my nose" in the example mentioned above is lost in any analysis that treats it as mere repetitions of the separate words *for, my* and *nose.* It also fails to reflect the effect of the proximity of the repetitions. Thus the three repetitions of *Joseph Nemo,* in the same passage, are separated from each other and appear less idiosyncratic than the repetitions at the end of the passage, but the TTR is not affected by the spacing and location of distributions of this kind.

When the vocabulary used in a passage of a given length is banal, i.e., limited to commonly used, high-frequency words, it is likely to contain more repetitions of words than passages of similar length that employ a wider range of vocabulary. Hence, the observed low TTRs of schizophrenic patients could be an artifact of limited vocabulary rather than a consequence of pathology.

With these considerations in mind, the purpose of the present study is to investigate the relationship of schizophrenic thought disorder to measures of repetition that include phrase units, proximity of repetitions and word frequencies. Our purpose is to determine whether such measures distinguish schizophrenics (as we would hypothesize) from non-schizophrenics and to what extent they are associated (as we would also hypothesize) with certain attributes of schizophrenia, i.e., thought disorder. We predict the following: 1) in oral language, schizophrenics will have more phrase repetitions than non-schizophrenics; and more specifically, thought-disordered schizophrenics will produce more phrase repetitions than non-thought-disordered schizophrenics; 2) phrase repetitions will be positively related to formal thought disorder; 3) phrase repetitions will distinguish schizophrenics from non-schizophrenics and thought-disordered schizophrenics from non-thought-disordered schizophrenics to a greater degree than does the TTR; 4) the word-frequency pattern of repetitions in spoken language will also distinguish schizophrenics from non-schizophrenic groups; and 5) repeated phrase units will occur in closer proximity in the sample of schizophrenics than in non-schizophrenics.

SUBJECTS

Psychiatric patients bearing current diagnoses of schizophrenic and affective disorders were obtained through referral by clinicians from the Massachusetts General Hospital and the Augusta (Maine) Mental Health Institute. Normal subjects were recruited from the hospital and university communities. All subjects signed consent forms. The sample consisted of 40 subjects with schizophrenic disorders, 20 subjects with affective disorders (psychiatric controls), and 22 normal control subjects. Mean age, education, length of illness, sex ratio, hospital status, and length of hospital admissions, are presented in Table 1. Most of the psychiatric patients had spent only brief periods in the hospital (i.e., a total of less than two months). There was no difference in mean total hospitalization time for the schizophrenic and affective disorder groups. Thirty-five (87.5%) schizophrenic subjects were receiving antipsychotic medication at the time of the investigation. Ten (50%) of the affective disorder controls were receiving antipsychotic medication. None of the normal controls were on medication.

METHOD

The patients participated in a semi-structured interview from which diagnoses were established according to the Research Diagnostic Criteria (RDC) (Spitzer, Endicott and Robins, 1978). Schizophrenic subjects were also given subtype diagnoses (e.g., paranoid,

TABLE 1

Subject Characteristics

	Group			
	TD Schizophrenics	NTD Schizophrenics	Affective Controls	Normal Controls
Number	24	16	20	22
Mean age	31.8 ± 7.8	30.2 ± 6.5	33.4 ± 10.5	21.9 ± 3.0
Mean years of education	12.2 ± 2.0	12.6 ± 1.8	13.8 ± 2.1	15.3 ± 2.2
Mean length of illness (years)	11.3 ± 6.4	8.0 ± 5.4	11.3 ± 6.7	–
% Females	20.8	25.0	55.0	55.0
Hospital status (inpatient/outpatient)	5/19	3/13	3/17	–
Length of hospitalization (More than 2 months/ less than 2 months)	8/16	6/10	10/10	–

disorganized, and undifferentiated) in addition to satisfying a second set of diagnostic criteria (Feighner, Robins, Guze, Woodruff, Winokur and Munoz, 1972). The subjects presenting affective disorders were also given RDC subtype diagnoses of unipolar (depression only), bipolar (fluctuations of depression and euphoria), and schizoaffective disorders. The application of these diagnostic criteria is essential if the problems of less reliable methods are to be avoided. Rated dimensions of formal thought disorder (FTD) derived from the Schedule for Affective Disorders and Schizophrenia (SADS) (Spitzer and Endicott, 1977) include impaired understandability, loosening of associations (or derailment), disturbed logic and poverty of content of speech. Examples of these dimensions of thought disorder as described in the SADS (Spitzer and Endicott, 1977) are:

Impaired understandability: This may be due to any combination of the following: lack of logical or meaningful connections between words, phrases or sentences; excessive use of incomplete sentences which is not seen as a part of psychomotor retardation; excessive irrelevancies or abrupt changes in subject matter; distorted grammar or syntax; idiosyncratic word usage; use of empty, repetitious, stereotyped or obscure phrases. "I don't quite gather. I know one right and one left use both hands, but I can't follow the system that's working. The idea is meant in a kind way, but it's not the way I understand life" (Mayer-Gross, Slater and Roth, 1969).

Derailment, loosening of associations: Repeatedly saying things in juxtaposition that

lack a readily understandable relationship, or shifting idiosyncratically from one frame of reference to another. "I'm tired. All people have eyes." In response to questions about concern that he will be deserted by his friends, patient replies, "I wonder what's for dessert today?" (Bemporad and Pinsker, 1974).

Illogical thinking: Thinking in which facts are obscured, distorted or excluded or thinking which contains clear internal contradictions or in which one premise does not follow from another. This is a complex and subtle judgment which usually requires a knowledge of the subject's reasoning process. Patient refuses to sit on a chair because it is yellow. Patient explains that she gave her family IBM cards she punched in an effort to overcome communication difficulties with them. In answering questions about his first hospitalization, patient says, "It could have been a few years before or after I was born."

Poverty of content of speech: Speech is adequate in amount but conveys little or no information because of vagueness, talking past the point, empty repetitions or use of stereotyped or obscure phrases. It does not include poverty in the amount of speech. Example: patient is asked how he likes the hospital: "Well, er . . . as er . . . don't know quite how to say it. It isn't the same as being in the hospital as er . . . working er . . . the job isn't quite the same, er very much the same but, of course, it isn't quite the same" (Wing, Cooper and Sartorius, 1973).

These dimensions were rated on a scale ranging from 0 (absence) to 5 (presence) of the feature to an extreme degree. A mid-range score of 3 or above on any of the four rated dimensions qualified the subject as thought-disordered (TD). A total FTD score was calculated by adding the separate ratings. These ratings were made by two experienced clinicians, blind as to laboratory assessments of repetitiousness. The reliability of their judgments of thought disorder was high, 0.91 by the Kappa coefficient statistic (Cohen, 1968).

Formal thought disorder identified 24 (60%) schizophrenic subjects. The remaining 16 (40%) schizophrenic subjects showed little or no FTD. Only one of the affective disorder controls (subtyped as schizoaffective) was judged to be thought-disordered. None of the normal controls satisfied the criterion for thought disorder.

Subjects were instructed to describe a Brueghel painting, "The Wedding Feast." Samples of at least 100 words were obtained. Those subjects whose spontaneous comments terminated prior to achieving the desired length were encouraged by the experimenter to continue the descriptions by such prompts as "Anything else?" or "Is that all?". Prompts do not appear to have provoked repetition of previous components of the utterance, and were aimed at getting new material from the speaker. These oral language samples were tape-recorded and transcribed.

The assessment of the language samples consisted of several indices of repetition. These included two-word phrase repetitions, three-or-more-word phrase repetitions, total phrase repetitions, and oral perseverations. A phrase repetition was defined as two or more words in sequence in the form of a phrase that was repeated at least once in the 100-word segment. An oral perseveration was defined as the directly successive repetition of a single word at least twice. Each index was calculated for each subject's oral language sample. Where a two-word phrase was contained within a phrase of three or more words

that was repeated at least once in the sample, that phrase was counted as a three-or-more-word phrase repetition. Total phrase repetitions were obtained by adding the number of two-word and three-or-more-word phrase repetitions in each 100-word language sample. Since 68% of the samples were of lengths greater than 100 words, these measures were computed for each 100-word segment (with the maximum number of segments set at two), designated by the Roman numerals I or II in the results. The separate analysis of the first 100 and second 100 words rules out both a "fatigue effect," where the patient may repeat himself more after speaking for a while, as well as a "practice effect," in which the patient actually improves and does not repeat himself as much in the second 100 words.

The following speech sample demonstrates a number of the repetition indices. The phrase "that looks like" is a three-word phrase repetition due to the fact that it appears three times. "They had" is a two-word phrase repetition, appearing twice in the sample. "And . . . and" is an oral perseveration.

> It looks like the dark ages in nineteen twelve, where they were cooking. They were cooking Venus wheat and rice and anything else they had that they don't have now. And everything they had was health food, that looks like some dry vegetation. That looks like the top of Flash Gordon rock, it's . . . and that looks like Cropper, he . . . that looks like a ancient weapon and muskets and . . . and a soldier in a chef's suit, pouring wine and water. That can't be bamboo, they didn't go there yet. They're sitting on homemade wooden furniture, woodmen furniture. That's England America.

Word frequency of repeated words was obtained by consulting Kučera and Francis (1967). The frequency per million words for a repeated word was multiplied by the number of repetitions within the 100-word segment. Once these values were obtained for the sample, the mean frequency was calculated. The mean frequency for the second 100-word segment was computed the same way. Mean segmental word frequency was the average mean frequency for the two segments of sample.

Proximity of phrase repetitions was determined by the number of words spoken between the first utterance of a two-word or three-or-more-word phrase repetition and the next repetition of the same phrase. In the case where phrases were repeated more than once, the interval before each subsequent repetition was evaluated. The mean intervals were computed separately for two-word phrase repetitions and three-or-more-word phrase repetitions in the first and second 100-word segments.

RESULTS

Phrase repetition indices

The means and standard deviations for the repetition indices derived from the oral language samples for the TD schizophrenic, NTD schizophrenic, affective disorder control and normal control groups are presented in Table 2. One-way analysis of variance (ANOVA) indicated a significant effect of group membership for four of the repetition variables and a fifth that approaches statistical significance (Table 3). Affective controls

TABLE 2

Mean Values of the Repetition Indices

Group	*n*	2-word Phrase	3-or-more-word Phrase	Total Phrase	Oral Perseveration
		First 100-word segment (I)			
TD Schizophrenics	24	2.08 ± 1.59	1.58 ± 1.14	3.65 ± 2.04	0.75 ± 1.07
NTD Schizophrenics	16	1.56 ± 1.03	1.38 ± 1.20	2.94 ± 1.57	0.81 ± 1.33
Affective Controls	20	1.84 ± 1.40	0.58 ± 0.51	2.42 ± 1.30	0.37 ± 0.68
Normal Controls	22	1.14 ± 1.70	1.00 ± 0.93	2.14 ± 1.72	0.50 ± 0.67
		Second 100-word segment (II)			
TD Schizophrenics	17	2.00 ± 1.41	1.47 ± 0.94	3.47 ± 1.97	0.78 ± 0.83
NTD Schizophrenics	9	1.11 ± 0.93	1.11 ± 0.60	2.22 ± 1.39	1.12 ± 1.11
Affective Controls	15	1.27 ± 1.16	0.80 ± 0.86	2.07 ± 1.28	0.27 ± 0.46
Normal Controls	13	0.77 ± 0.93	0.69 ± 0.85	1.64 ± 1.28	0.21 ± 0.43

TABLE 3

Significant Results from Analysis of Variance (Repetition Variables)

Variable	*F*	*df*	*p*	*eta*
3-or-more-word phrase (I)	4.15	3.78	.009	.37
Total phrase (I)	3.50	3.78	.02	.35
2-word phrase (II)	2.98	3.51	.04	.39
3-or-more-word phrase (II)	2.59	3.51	.06	.36
Oral perseverations (II)	4.77	3.51	.005	.47

resembled normal controls, producing less repetitious speech than schizophrenics. *A priori* contrasts were then performed to examine the significance of the differences between the means of the repetition variables for TD plus NTD schizophrenics versus non-schizophrenics (affective disorder and normal control groups combined) , TD versus

TABLE 4

Significant Results from Planned Comparisons

Contrast 1: Schizophrenics vs. Non-Schizophrenics

Variable	*t*	*df*	*p*	*r*
3-or-more-word phrase (I)	3.12	78	$p < .0025$	.33
Total phrase (I)	2.66	78	$p < .005$	.29
2-word phrase (II)	1.65	51	$p < .05$	.22
3-or-more-word phrase (II)	2.28	51	$p < .025$	.31
Total phrase (II)	2.31	51	$p < .025$	.31
Oral perseveration (II)	3.29	51	$p < .001$	.42

Contrast 2: TD Schizophrenics vs. NTD Schizophrenics

Variable	*t*	*df*	*p*	*r*
2-word phrase (II)	1.85	51	$p < .05$	.25
Total phrase (II)	1.96	51	$p < .05$	.26

Contrast 3: NTD Schizophrenics vs. Non-Schizophrenics

Variable	*t*	*df*	*p*	*r*
3-or-more-word phrase (I)	2.26	78	$p < .01$	.25

NTD schizophrenics and NTD schizophrenics versus non-schizophrenics. The significant results obtained are presented in Table 4. These multiple planned contrasts are justified by a significant omnibus F from the one-way analysis of variance.

Results from the analysis of the relationship between the repetition indices and rated dimensions of formal thought disorder are presented in Table 5. The hypothesis that the language repetition indices would be positively correlated with the dimensions of FTD was supported.

Analysis of covariance examined the effect of group membership with age, sex, education, and length of illness as covariates. The following variables were statistically significant after accounting for the covariates: three-or-more-word phrase repetition (I) [$F(3, 55) = 2.81$, $p = 0.048$, $eta = 0.36$], two-word phrase repetition (II) [$F(3, 18) = 3.099$, $p = 0.05$, $eta = 0.58$], three-or-more-word phrase repetition (II) [$F(3, 18) = 1.25$, $p = 0.0653$, $eta = 0.42$], and total phrase repetition (II) [$F(3, 18) = 4.901$, $p = 0.012$, $eta = 0.67$]. Hence, in these repetition indices, the covariates did not affect the original findings.

TABLE 5

Correlations Between Repetition Indices and Dimensions of Formal Thought Disorder

Variable	Dimension of Formal Thought Disorder	Correlation
2-word phrase (I)	Derailment	.27*
	Logic	.22
3-or-more-word phrase (I)	Derailment	.19
	Understandability	.19
	Poverty of content of speech	.25*
Total phrase (I)	Derailment	.34*
	Logic	.29*
	Understandability	.26*
	Poverty of content of speech	.19
2-word phrase (II)	Derailment	.31*
	Logic	.30*
	Understandability	.34*
	Poverty of content of speech	.28
3-or-more-word phrase (II)	Derailment	.32*
	Logic	.35*
	Understandability	.27
	Poverty of content of speech	.28
Total phrase (II)	Derailment	.38*
	Logic	.39*
	Understandability	.37*
	Poverty of content of speech	.34*
Oral perseveration (II)	Derailment	.41*
	Logic	.38*
	Understandability	.42*
	Poverty of content of speech	.32*

* $p < 0.05$

The effect of medication on the repetition indices was evaluated by comparing schizophrenic patients taking antipsychotic medication (n = 35) with those who were medication-free (n = 5). Although this comparison is limited by the small number of drug-free subjects, it was considered useful to examine the statistical results. For schizophrenic subjects, the analysis indicated that medicated patients produced more total phrase repetitions (I) [$t(38) = 1.80, p < 0.05, r = 0.28$], and oral perseverations (I) [$t(38) = 2.20, p < 0.005, r = 0.34$] than drug-free patients. The relationship between hospital status and repetition indices was examined by matching the inpatients in the schizophrenic (n = 8) and affective disorder control groups (n = 3) with a comparable sample of outpatients based on diagnosis, age, years of education and presence or absence of thought disorder. Compared to outpatient subjects, inpatient subjects had fewer oral perseverations (I) [$t(20) = -2.34, p < 0.01, r = 0.22$] and more three-or-more-word phrase repetitions (II) [$t(9) = 1.23, p < 0.05, r = 0.38$]. The effect of length of hospitalization was assessed by separating the patients into subjects with less than two months of hospitalization (26 schizophrenics, 10 affective disorder controls) and those with more than two months hospitalization (14 schizophrenics, 10 affective disorder controls). Length of hospitalization was associated with more three-or-more-word phrase repetitions (II) in the schizophrenic group [$t(24) = 2.56, p < 0.01, r = 0.46$] and in the affective disorder control group [$t(14) = 1.90, p < 0.05, r = 0.36$].

Word frequency

Group means and standard deviations for the word-frequency variables were compared through a one-way ANOVA that tested the null hypothesis that there were no significant differences between the groups on the frequency variables. The null hypothesis was accepted for the mean frequency in the first 100-word segment [$F(3, 78) = 2.08$, n.s.] and the second 100-word segment [$F(3, 51) = 1.21$, n.s.]. The null hypothesis was rejected for mean segmental word frequency [$F(3, 78) = 2.70, p < 0.05$, *eta* = 0.31]. *A priori* comparison revealed that the schizophrenic group had a lower mean segmental word frequency than the non-schizophrenic group [$t(78) = -2.28, p = 0.025, r = 0.25$].

Analysis of covariance failed to reveal any significant effects of age, years of education, length of illness, and length of hospitalization on mean frequency (I), mean frequency (II) or mean segmental word frequency. Comparison of medicated with non-medicated schizophrenics indicated that the former had lower mean frequency (I) [$t(38) = -2.08, p < 0.025, r = 0.32$], lower mean frequency (II) [$t(24) = -2.02, p < 0.05, r = 0.38$], and lower mean segmental word frequency [$t(38) = -2.31, p < 0.025, r = 0.35$]. No other significant differences were detected. The analysis of the relationship between hospital status and word-frequency variables demonstrated that inpatients had lower mean frequency indices than outpatients (mean frequency (I) [$t(20) = -3.10, p < 0.005, r = 0.32$], mean frequency (II) [$t(10) = -2.08, p < 0.05, r = 0.42$] and mean segmental word frequency [$t(20) = -3.47, p < 0.005, r = 0.61$]).

Proximity of repetitions

A one-way ANOVA indicated a lack of significant group differences for the mean

intervals of two-word phrase repetitions (I and II) and three-or-more-word phrase repetitions (I and II).

DISCUSSION

Our data support the hypothesis that carefully diagnosed schizophrenic patients produce language with significantly more phrase repetitions than controls. The largest differences emerge in the second 100-word segments, suggesting that schizophrenics maintain or increase their repetition patterns as they continue to speak, while control subjects appear to become less repetitious with continuous speech. TD schizophrenics manifested more repetition than other groups, including NTD schizophrenics. Yet, even the NTD schizophrenic group, which is characterized by language less deviant than that of the TD group, was significantly different from the control group on one repetition variable. Repetitions are consistently less frequent among controls. These results suggest that repetitiousness is not adequately estimated by the TTR and that repetitiousness is a major characteristic of schizophrenic speech, including that produced by NTD schizophrenic subgroups.

This study also supports the hypothesized positive relationship between phrase repetition indices and the presence of formal thought disorder. Though one might expect the correlation between poverty of content of speech and repetition indices to be stronger, it is possible that the requirement for as much speech as was sampled in this study, itself served as a selection factor in removing more severely disturbed subjects whose impoverished thinking may be even more repetitious.

Age, sex, education, and length of illness did not affect the results. Schizophrenic patients under antipsychotic treatment had more phrase repetitions and oral perseverations than those who were not taking antipsychotics. This is interesting but difficult to interpret; the sample of nonmedicated schizophrenics is small, the potential confound with severity of illness cannot be overlooked, and the number of comparisons undertaken serves to weaken the certainty of possible associations between drug treatment and repetitiousness.

The finding that word-frequency counts comparing schizophrenic and non-schizophrenic individuals resulted in significant differences, coupled with the fact that repeated words in schizophrenic utterances have a lower mean frequency count (i.e., the words repeated are less common) than those of controls, indicates that repetition patterns in schizophrenic speech are not artifacts related to limited ranges of vocabulary. While schizophrenic patients may have limited vocabularies, at least those words that are repeated by these patients came from a less-common-vocabulary part of the lexicon than for normals. The fact that years of education, often considered a correlation of vocabulary range, does not influence the word-frequency finding, is also consistent with the interpretation and raises the question as to why the pattern of repeated words is different from normals. Apparently in schizophrenic speech there is a breakdown in the mechanism that governs normal repetition patterns.

Several explanations for repetitiousness in schizophrenic language have been put

forward. One holds that the patient's excessive repetition is the result of short-term memory deficits, which, in a sense, suggests that the patient "forgets" what he/she says or writes and is less likely to profit as much as the normal speaker does from the redundancies that he/she produces in his/her own language (Venables, 1977; Yates, 1966). Another possibility is that increased repetition occurs because low-frequency words have dropped out of usage in the vocabulary of the patient, leaving a smaller pool of high-frequency words available for utterance (Maher, 1972). Observations of increased repetitiousness are consistent with the immediacy hypothesis (Salzinger, Portnoy, Pisoni and Feldman, 1970) and the disattention hypothesis (Cromwell and Dockecki, 1968), namely that the speaker has difficulty "clearing the slate" to process different inputs and remains unable to withdraw attention from the most recent task. Mittenecker (1951) suggested that repetition arises because the utterance of words activates them "submentally" and this activation persists for some time increasing the probability of repetition. In a related manner, Maher (1983) has suggested that repetition is to be understood as an instance of associational interference, wherein each word uttered activates its associates which include itself, as in the tendency in association tasks to repeat the stimulus word. Chaika (1982) sees a lack of control in the selection of linguistic material as a neurologic factor influencing the occurrence of inappropriate repetitiveness. She also notes that rhyming, alliterating, and glossomania are, like words and phrases, examples of the density of repetition in schizophrenic speech.

The shift from repetition to non-repetition as discourse progresses in the normal speaker suggests that planning is taking place after speech begins, the preparatory utterances being less organized – and hence, more repetitious – but then giving way to an adequately planned sequence. As speech continues, familiarity with the description task increases and permits greater facility in drawing upon the lexicon for more varied and appropriate utterances. For the schizophrenic, however, organization does not improve in this way.

It is evident that a really satisfactory explanation of the repetition phenomenon in schizophrenia has yet to be developed. Previous theories, such as those above, have at least one relevant and attractive feature, namely the frequent proposal that a lack of control or capacity to inhibit normal associated linguistic units results in the pattern of deviancies seen in schizophrenic speech. To degrees that vary because of the severity of the breakdown of this normal mechanism, utterances may fail to be subordinated to the requirements of sentence and topic, as Chaika (1982) and Maher (1972) have suggested. The widespread occurrence of heightened repetitiousness in a cross-sectional sampling of speech such as this one, does indicate that despite the fluctuating nature of anomalous speech in schizophrenic disorders, the consistent and quantifiable features of repetition deserve further investigation, perhaps with factor-analytic or related multivariate techniques.

In summary, we find that schizophrenics produce more repetitions than non-schizophrenics; that the patterns of repetition of TD and NTD schizophrenics appear to be similar, differing only in severity. This contrasts with several previous studies that have demonstrated that NTD schizophrenics produce language similar to normals; in this investigation, the findings suggest that differences in repetition patterns distinguish

their language from non-schizophrenic controls. The word-frequency patterns of repeated words in language samples also distinguish the schizophrenics from non-schizophrenics, indicating that limited vocabulary can not be the explanation of the repetitiousness observed. And finally, we found that repeated units did not occur in closer proximity among schizophrenics when compared to non-schizophrenic controls, which undermines a simple perseverative effect explanation.

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