A Psycholinguistic Analysis of Schizophrenic Language.

Patricia Faith Wilcox
Louisiana State University and Agricultural & Mechanical College

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A PSYCHOLINGUISTIC ANALYSIS OF SCHIZOPHRENIC LANGUAGE

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in

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by

Patricia F. Wilcox
B.S., Louisiana State University, 1967
M.A., Louisiana State University, 1971
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ABSTRACT

In order to test Salzinger's Immediacy Hypothesis and the notion that schizophrenics can understand other schizophrenics better than normals can, normal Ss (n=10) and schizophrenic Ss (paranoid n=10; nonparanoid n=10) completed a cloze analysis of normal speech samples (n=10) and schizophrenic speech samples (paranoid n=10; nonparanoid n=10). It was further hypothesized that language structure of paranoid schizophrenic Ss approximates that of normal Ss more closely than does that of nonparanoid schizophrenic Ss.

Results indicated that there is both an encoding and decoding impairment in schizophrenic communication and that the decoding impairment is as strong for schizophrenic speech as for normal speech. Data provided support for the Immediacy Hypothesis indicating schizophrenic Ss were less able than normal Ss to utilize more remote contextual cues. There was further evidence that paranoid schizophrenic language is more similar in structure to normal language than is nonparanoid schizophrenic language.

It was suggested that further research on the structural differences among normal, paranoid and nonparanoid schizophrenic speech be carried out in order to aid in diagnosis, therapy and treatment evaluation of schizophrenics.
INTRODUCTION

The psychiatric interview is the most common means used by clinicians to determine diagnosis, prognosis, treatment procedure and treatment outcome of psychopathology. These judgments are based to a large extent on the actual verbal component of the communication between client and clinician. The importance of language and distortions in social communication in assessing schizophrenia, in particular, has been stressed ever since schizophrenia was identified as a clinical syndrome (Bleuler, 1950; Jaffe, 1966). Despite the central role accorded to the verbal behavior of the schizophrenic, proportionately little has been done to study that behavior per se in an objective, quantitative manner (Salzinger, Portnoy, & Feldman, 1966).

Although the definition of schizophrenia has varied widely, there is general agreement that the central disturbance is that of a thought disorder (American Psychiatric Association, 1968). When, however, the construct of schizophrenia (and concomitantly that of thought disorder) is evaluated in terms of criteria for its adequacy as a scientific construct, it is found to be highly unsatisfactory (Cromwell & D'Kecki, 1968). Salzinger, Portnoy and Feldman (1966) believe that the vast literature describing thought
disorder in schizophrenia contains too much theory and too little data.

Clinicians and researchers in psychopathology have tended to regard deviant language behavior as reflecting a more basic disturbance of thought (Forrest, Hay, & Kushner, 1967; Maher, 1972; Hart & Payne, 1973). Critchley, after surveying the major aspects of psychotic speech, concluded that the "causation of schizophrenic speech affection lies in an underlying thought disorder, rather than in a linguistic inaccessibility" (Critchley, 1964, p. 364). Most of the major theorists advancing hypotheses about the nature of the thinking disorder, e.g. Gardner (1931) and Kasanin (1944) (regressive), Goldstein (1944) and Milgram (1959) (excessive concreteness of thought), Von Domarus (1944) (deficiency in logical deductive reasoning) and Arieti (1974) (teleological regression), share a set of implicit assumptions about the relationship between language and thought. This relationship can be conceptualized in terms of a model likened to a typist copying from a script before her (or him) (Maher, 1972). Her copy may appear distorted because the script itself is distorted. She may be an inefficient typist typing a perfect original script. Or she may be an inefficient typist typing an incoherent script producing a distorted copy. In general most theorists accept the notion that she is a good typist typing from a deviant script. That is, "the language is a mirror of the thought" (Maher, 1973, p. 3). In line with this assumption, Rosenberg and
Koplin (1968) have cited considerable evidence that the underlying language ability of schizophrenics is not impaired.

Although there are some differences of opinion as to whether all schizophrenics reveal disturbances in language (and by inference, thought) (Bannister, 1960), this is generally considered one of the outstanding features of schizophrenia. Descriptions of deviant language behavior of schizophrenics abound in the literature. For example, Bleuler (1950) emphasized loose associations and disjointed utterances in schizophrenic language. Mayer-Gross, Slater and Roth (1960) stated that a thought disorder is indicated by such characteristics as "wooly vagueness," inconsequential following of side issues, direction by alliteration, clang associations, word salads and the use of words out of context. Rapaport, Gill and Schafer (1968) impress upon the clinician the importance of language as an indicator of thought disorder in the interpretation of projective tests. They note the prevalence of confabulations, fabulized combinations, peculiar and vague verbalizations in the performance of schizophrenics. No comprehensive study has been conducted to determine the ways in which these deviations in language relate (Cromwell & Dokecki, 1968).

Interpersonal theories of psychiatry have long stressed the aspect of disturbed communication in schizophrenics. Language is viewed as a "... vehicle of acculturation and a lifelong instrument of social adaptation.
..." (Jaffe, 1966, p. 692). In Sullivan's words (Sullivan, 1944, p. 5) "... language operations have to pertain not only to what we want, but also to saving up from experiences, both real and imaginary, which we do not want." He viewed schizophrenic language as a secondary result of the decreased need to communicate with people in the outside world (Sullivan, 1962).

Ferreira (1960) has noted that the schizophrenic may use a private language in order "not to communicate his thoughts, for in fact, he much fears to be misunderstood" (Ferreira, 1960, p. 134). Bateson et al. (1956) have developed this idea to explain the genesis of schizophrenia in terms of the "double bind" situation. They explain this as follows: the patient as a child received one message that threatened to punish him unless he did as he was told, and another message in direct conflict with it in which he was told (by nonverbal cues of the speaker or verbal and nonverbal cues by the other parent) not to regard the threat as coming from a punishing agent. Confusion generated by repeated exposures to this type of conflicting message results in a disinclination to communicate. The patient's experience with his clear communications is that they are punished no matter which way he responds to the injunctions made by the (usually) schizophrenogenic mother.

The influence of communication skills is so pervasive and subtle that it is often overlooked in research with schizophrenics. For example, a detailed analysis of
normal-schizophrenic differences in a sorting task commonly attributed to deficit in abstracting ability, according to McGaughran and Moran (1956) can be more accurately described as a result of privacy of the criteria for sorting, indicating a loss of social communication. It is this all-pervasive nature of the influence of communication skills and deficits which makes it so important that this behavior be a prime target of analysis.

There are some methodological advantages in using natural speech to understand better the nature of schizophrenia (Salzinger, Portnoy & Feldman, 1966). The problem of attitude, motivation or cooperation with the research task set, which has been responsible for some apparent differences in schizophrenics versus normals (Shakow, 1963) can be easily controlled. The investigator does not have to train the subject until his behavior on the task has stabilized. His verbal behavior has already reached a state of relative stability. By studying the language as raw data rather than as a report of something else, the investigator gets around problems stemming from defensiveness and lack of motivation (Salzinger, Portnoy & Feldman, 1966).

Advances in psycholinguistics have made it possible to implement an objective and quantitative comparative study of normal and schizophrenic language using the language itself as the raw data (Pittenger & Smith, 1957). Psycholinguistics is a "discipline which examines both the structure of language and the psychological states of its
users and attempts to relate the two” (Jaffe, 1966, p. 689). Although psycholinguistics as a discipline is still developing its theoretical base, many investigators believe that it is legitimate to proceed to apply its concepts and methodology in the attempt to solve problems involving normal language processing such as language acquisition, learning to read, and language deficits stemming from pathological conditions such as deafness, aphasia and schizophrenia (Rosenberg & Koplin, 1968). Attempts are being made to relate degree and type of psychopathology, personality style, degree of psychological stress, quality of interpersonal communications, to name only a few, to the structure of recorded messages in an attempt to develop reliable and predictive linguistic indices of these variables (Wynne & Singer, 1963; Morris & Wynne, 1965; Jaffe, 1966).

The Psycholinguistic Model

The psycholinguistic model is based on a modification of communication theory or information theory as used in electrical engineering (Miller & Frick, 1949; Miller, 1950; and Jaffe, 1966). In this model a human being is a communication unit, both a source and a destination of messages, equipped both to send and receive messages, often simultaneously. Since human communication is essentially social, a second modification lies in the concept of a connection between two such communication units into an interpersonal communication system. A third modification
lies in the subdivision of the communication channel into an auditory-vocal band and a visual-gestural band. Distinguishing both bands in terms of reception (input) and expression (output) has proved to have great utility (Jaffe, 1966). In this model other bands such as touch, odor, and warmth are included; however, most of the research has been on the auditory and visual bands.

Osgood and Sebeok describe psycholinguistics as follows:

The rather new discipline coming to be known as psycholinguistics . . . is concerned in the broadest sense with relations between messages and the characteristics of human individuals who select and interpret them. In a narrower sense, psycholinguistics studies those processes whereby the intentions of speakers are transformed into signals in the culturally accepted mode and whereby these signals are transformed into the interpretations of hearers. In other words, psycholinguistics deals directly with the processes of encoding and decoding as they relate states of messages to states of communicators (Osgood & Sebeok, 1954, p. 4).

The introduction of the psycholinguistic model has reintroduced to psychology the valuable data of natural language as respectable objects of scientific inquiry (Miller, Galanter & Pribram, 1960).

**Information, Redundancy, and Transitional Probabilities**

Shannon (1948, 1951) is one of the first communication engineers to have introduced the concept of "information" which is significant in the study of schizophrenic language. "A unit of communication is said to convey information when its occurrence cannot be predicted with complete
accuracy from knowledge of the previous units in the message" (Maher, 1972, p. 3). Closely related to this idea is the concept of redundancy. When a unit can be predicted from the prior elements in the message, it is defined as redundant.

Redundancy has helped information theorists explain the fact that a word heard in the context of a sentence is more intelligible than the same word heard in isolation (Miller, 1954). A word heard in a sentence is selected from a much smaller set of words that are appropriate in the sentence context than a word heard in isolation. More information is needed to hear the isolated word correctly. In the sentence some of the information in the word is provided by the rest of the sentence (Miller, 1954).

The meaning of the term redundant in this sense is not the same as the more common meaning of semantic redundancy. The difference can be illustrated by the following two examples from Maher (1972). If a listener is requested to complete the incomplete message "The title of the popular old song is 'Boys and girls come out to ____'," he can guess with a relatively high degree of certainty that the missing word is play, and in this sense the word play is redundant. If, on the other hand, the listener were required to complete the message "Parents are requested to bring their children and _____," and the correct last word is offspring, this word would be very difficult to predict. In this sense offspring is not redundant but conveys information. It is,
however, semantically redundant because offspring is a synonym for children in ordinary usage.

The concepts of redundancy and information are closely related to the existence of transitional probabilities in the language. "When the transitional probability that one unit will be followed by another specific unit is very high, then the actual occurrence of the second unit is relatively redundant" (Maher, 1972, p. 4). For example, the transitional probability that in the English language the letter Q will be followed by the letter U is close to 1.0, that is, almost certain. The probability that the letter N will be followed by X is low but that it will be followed by G is quite high (Maher, 1972). In normal English the predictability that one word follows another may be estimated on either the syntactic or lexical level. For example, in the message "The tone of the cello was very ____," it is quite probable that the missing final word is an adjective such as rich, mellow, warm, etc., and predicting the syntax of the missing word is relatively easy. Predicting the specific word (lexical) would be more difficult. Although clinical cases of disturbance of syntax are reported (Maher, 1972), they appear to be less frequent than semantic disturbances. Where there are syntactical rules determining the word-class (noun, verb, etc.) that would normally follow a particular utterance, these rules will tend to determine the probability that an association will intrude. That is, an association of the appropriate word class will more likely
intrude than an association of an inappropriate word class. Maher (1972) postulates that inappropriate word class items would intrude only when attentional focusing is severely impaired and that disrupted syntax would be a sign of greater degree of psychopathology than semantic disturbances alone.

Redundancy in the language is a safety margin for understanding communication under difficult conditions, e.g., noise or fatigue of listener (Rubin cited in Maher, 1972). It has the merit of preventing errors and making communication a more reliable process. Results of articulation tests with various types and amounts of redundancy indicate that the redundant message gains in reliability most of what it loses in speed (Miller, 1954).

Measurement of redundancy in language samples is most commonly carried out by the use of the Cloze procedure (Taylor, 1953). This is a relatively simple procedure in which the text to be measured is prepared by deleting every nth word (usually the fifth). Normal readers are then given the passages and asked to guess the missing word for each omission. Redundancy of the passage is measured in terms of the percentage of correct identifications in the passages. A more detailed discussion of this procedure and research with cloze analysis will be presented later in this dissertation. One final note on the measurement of redundancy is particularly relevant to the analysis of schizophrenic language. Shannon (1951) and Miller (1954) have noted that in the
guessing procedure, the assumption is made that the verbal habits of the guesser are statistically identical with the verbal habits of the author who generated the text. Although this assumption is not considered to be exactly true in any case, it may be approximately true if the text and guesser are selected with this in mind. Another way of looking at this is that the more the verbal habits of the guesser are similar to that of the author, the greater the likelihood that the guesser will be correct in guessing the missing words. This suggests that if there is a similarity in the structure of thought disorder in schizophrenics, they should be able to predict schizophrenic language more accurately than they can predict normal language. This topic will be considered later in this dissertation.

Statistical Properties of Language—
Zipf's Law and Type-Token Ratios

In 1949, Zipf postulated the Principle of Least Effort to account for some statistical regularities in human behavior (Zipf, 1949). Essentially, his principle states that like many physical systems, human behavior develops towards the conservation of energy. The findings which led him to develop this theory can be related to the function between word frequency and rank of frequency in language usage. In any passage, one may count the total number of words used (tokens) and the total number of kinds of words used (types). The frequency of use of each type is counted and ranked and then the rank order of types is plotted.
against the actual numbers of their frequencies. Zipf discovered that there appears to be a regularity in the relationship in which Rank X Frequency is a constant. When the two scales are plotted in a logarithmic transformation, the resulting graph is linear with a negative slope from left to right. This relationship holds up in many languages and samples of normal English (Jaffe, 1966; Maher, 1972). A simpler variation of type-token frequencies called the type-token ratio has been used more often in psycholinguistic research (Jaffe, 1966; Salzinger, Portnoy & Feldman, 1966; and Maher, 1972). The type-token ratio is computed by dividing the number of types by the number of tokens in a sample and reporting the resulting ratio as a decimal. This ratio has been shown to be a fairly reliable measure of language diversity and word repetition.

In the past decade there has been an increased interest in gathering data on the psycholinguistic properties of the language of schizophrenics using some of the above concepts derived from information theory. These attempts have had, as one aim, the establishment of a quantifiable criterion of language deviancy. This task of data gathering can be considered to be in the early stages and much more research needs to be carried out before reliable and meaningful measures can be used clinically. While these measures do not point at this time to the etiology of psychopathology (Maher, 1972), they are potentially clinically useful as diagnostic and prognostic indicators as well as
indicators of psychotherapeutic progress (Feldstein & Jaffe, 1963).

The next section of this dissertation will review the literature on psycholinguistic analysis comparing normal and schizophrenic language focusing chiefly on lexical measures of speech samples. Finally, various theories of associative processes of schizophrenic language will be discussed in the light of available data and a research proposal testing implications of Salzinger's Immediacy Hypothesis (Salzinger, 1973) will be developed.

**Studies in Content Analysis**

Content analysis in its classical form involves an independent count of different classes of verbal behavior. In many studies, simple frequency counts are correlated with diagnostic categories (Jaffe, 1966). A more sophisticated version of content analysis, called contingency analysis has been advocated by Osgood (1959). Contingency analysis is concerned not only with how often a given symbolic form appears in each of several bodies of text, but also how often it appears in conjunction with other symbolic units. Conclusions about a passage are drawn on the basis of statistical indices of covariation of the various categories. For example, if one were interested in investigating whether a person tends to think of two people together, one could compare a count of the number of times that each person is mentioned alone in a sentence and the number of times the two are mentioned together (Salzinger, 1973).
Gottschalk and his colleagues (Gottschalk, 1967; Gottschalk & Gleser, 1969) have constructed a system of content analysis for investigating differential speech patterns in psychopathology. Gottschalk and Gleser (1964) Gottschalk et al. (1958) obtained speech samples by asking the patient to talk about anything for a period of three to five minutes. Using the grammatical clause as the scored unit, they assigned weights to each clause. These weights were empirically derived on the basis of how well each clause category had differentiated schizophrenics from other subjects. These units were then classified in terms of social integration and well being vs social alienation and personal malfunctioning. The schizophrenic scale of this content analysis included categories such as unfriendly interpersonal references, helpful interpersonal references, interpersonal references to self as getting better, and denial of feelings. Although this system of content analysis obviously involves some degree of subjectivity, it is nevertheless reliable and has had some success in differentiating schizophrenics from normal Ss and medically ill Ss.

Mahl (1959) has made an intensive content analysis of patients' speech during psychotherapeutic interviews. He has developed the speech disturbance ratio as a reliable indicator of anxiety. Laffal (1960, 1961, 1965) in an attempt toward analyzing speech of schizophrenics during the course of months of psychotherapy, developed a technique called the analysis of contextual associates. Using a list

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of ninety-four categories, each containing words of similar meaning, he found that the relative frequency of occurrence of the categories varied from the early and middle stages of therapy to the late stages of therapy. Laffal believed that the late stages represented new and more integrated behavior by the patient. He used an information theory measure to examine the variation of occurrence of different categories at various stages of therapy and found that as the patient improved, there was a reduction in the use of diverse categories. In addition he used correlations over categories to examine similarities among different patients. This technique had been used successfully by Salzinger (1958) in demonstrating the similarity between disturbed children and their friends and relatives. Laffal in these studies also examined the contexts of these various categories and was able to demonstrate different patterns of association among them.

Meadow et al. (1952) in an early attempt to classify the verbal behavior of schizophrenics, constructed the discomfort relief quotient (DRQ). They classified continuous speech samples into units showing discomfort, comfort or satisfaction, or neutrality. The DRQ was computed by dividing the number of discomfort statements by the total number of units. The DRQ failed to relate to a psychiatrist's clinical rating of tension; however, it did relate significantly to the schizophrenics' performance on a proverb interpretation test and to a measure of looseness of
associations derived from the same speech samples. The higher DRQ related to better performance on a proverb interpretation test and was interpreted as signifying relatively good adjustment. The more seriously disturbed patients showed a lack of insight into their discomfort and were unable to express it.

The lexical pattern of speech can be quantified by either formal measures such as word repetition (Jaffe, 1958) or by content categories such as stress, anxiety, or tension judgments (Dollard & Mowrer, 1947). This distinction, as Jaffe (1966) notes, breaks down in much empirical work where one finds a group of measures which are both formal and content indices. For example, the proportion of verbs spoken in the present tense which may increase with intense excitement and reflect the immediacy of experience can be used as an indicator of affective involvement (Jaffe, 1961). A proportionately high concentration of pronouns such as "I, me, myself, mine" may indicate self preoccupation; whereas "we, our, us" would indicate group affiliation (Lorenz & Cobb, 1954; Gottschalk et al., 1957). Attitudes of specificity-generality may be reflected in preference for either definite ("the") or indefinite ("a") articles (Jaffe, 1964). A series of studies by Lorenz and Cobb (1952, 1953, 1954) have shown that the language of the manic, the hysteric and the schizophrenic can be differentiated on the basis of distribution of such categories as substantives, adjectives, adverbs, main verbs, auxiliary verbs, pronouns, prepositions,
conjunctions, articles and interjections. Smith (1957) has studied tension in the written productions of a woman over a forty-year period of her life and found a reduction in word and grammatical class frequencies, word length and vocabularity diversity occurring after onset of senile dementia.

A variety of these lexical measures have been found to correlate with clinical categories (Lorenz & Cobb, 1954; Gottschalk et al., 1957); however there are wide ranges of variation within diagnostic groups which limit the prediction for an individual case. Some measures show trends relating to over-all psychosocial adjustment across diagnostic categories. It has been found (Gottschalk et al., 1957) that 1st and 3rd person plural pronouns (we-us) and qualifiers decrease with pathology and the ratio of self references to all pronouns increases with degree of maladjustment.

Pylyshyn (1970) has implemented a program of content analysis using units of analysis which are more complex than individual words. The long-term goal of his project is to work toward the development of a computer system which would aid in segmenting and analyzing these larger units of discourse. Heretofore the computer has been used primarily for analysis of word counts or counts of groups of words (Stone et al., 1966) and has been of little help in the initial phases of identification, classification and analysis of more molar units (Lennard & Bernstein, 1960; Marjerrison, Freedman & Cutler, 1962). Pylyshyn (1970) has chosen the
assertion defined on the basis of a finite verb fulcrum as his unit of analysis. He gathered statistics on various assertion introducers (if, because, etc.) and on forms of the finite verb and analyzed these in relation to the patients' clinical features. He then compared the ability of these statistics to discriminate between diagnostic categories with the discriminative ability of general style features such as total number of spoken words, frequency of certain key words, type token ratios and word uncertainty. He found that as a group, the syntactic scores were better able to discriminate among the diagnostic categories than were the general style indicators. Syntactic indicators which were particularly sensitive, included the frequency of the perfect phase of the finite verb (higher for schizophrenics), the frequency of qualifying subordinators as assertion introducers (lower for schizophrenics, depressives and neurotics), the frequency of the passive voice (higher for schizophrenics) and the frequency of occurrence of a formally defined category of verb called the "state" verb (higher for schizophrenics) and the "achievement" verb (lower for schizophrenics). Pylyshyn notes that this is an exploratory and descriptive study which needs replication and expansion.

**Statistical Properties Differentiating Schizophrenic Language: Type-Token Ratio**

Another approach to the study of schizophrenic language has been that of evaluating the nature of the
type-token ratios in schizophrenic speech. Whitehorn and Zipf (1943), in a classic study, examined long written samples of verbal behavior of schizophrenic patients in the light of type-token ratios (TTR). Their results indicated that schizophrenics tended to repeat themselves (low TTR) more than normals did. Such repetitiousness, they suggested, constitutes an example of a tendency toward autism. Mandelbrot (cited in Maher, 1972) has elaborated the statistical relation between types and tokens. Using Mandelbrot's work, Parks (1961) derived a rigorous mathematical description of this relationship to evaluate schizophrenic language. Fairbanks (1944) and Mann (1944) used the type-token ratio in comparing schizophrenic and normal language samples. They found significantly lower TTR's for schizophrenics than for college students in both spoken (Fairbanks, 1944) and written (Mann, 1944) language.

Seth and Beloff (1959) used TTR's to examine one hundred word speech samples of recorded conversation between patients and examiners. Schizophrenic and control samples were matched in terms of hospitalization, socioeconomic and geographical variables. Again, these investigators found that the schizophrenic patients had significantly lower TTR's than normals. Feldstein and Jaffe (1962) failed to replicate the original Fairbanks study using control groups more closely matched in schooling; however, their speech sample was small (only twenty-five words). Hammer and Salzinger (1964) have provided evidence that better
differentiation of groups can be achieved by using longer speech samples. Schizophrenic Ss in the Feldstein and Jaffe (1962) study were under tranquilizing medication. Salzinger et al. (cited in Amarel, Cheek and Stierham, 1966) have found that chlorpromazine can bring the TTR of schizophrenic Ss up close to that of normal Ss. This suggests a second reason for the failure of the Feldstein and Jaffe study to replicate the Fairbanks study. Pavy, Grinspoon and Shader (1969) found lower TTR's for chronic schizophrenics than for acute schizophrenics. Medication tended to bring the TTR of both groups up, but chronic schizophrenics with medication still did not reach the level of the acute group.

Low TTR's have been found to correlate positively with degree of electroencephalographic abnormality as well as with content and syntactical indices of diffuse cerebral dysfunction (Kahn & Fink, 1958; Jaffe et al., 1960). The TTR has been found to correlate with improvement in psychotherapy (Roshal, 1953), the more successful patients obtaining higher TTR's as compared to the unsuccessful patients. Mettenecker (cited in Maher, 1972) in a detailed analysis of repetition patterns has found that frequent repetitions at smaller intervals is characteristic of both schizophrenic Ss and schizothymic normals. Paranoid patients resemble normals more than schizophrenics. Mettenecker has suggested that repetition arises in language because the utterance of words activates them "submentally" and this activation persists for some time after.
In general, the TTR has been able to differentiate a degree of language pathology. The TTR's of schizophrenics tend to be lower than those of normal Ss but the range of differences in both sources is somewhat wide (Maher, 1972). If these results are to be taken as reliable, they suggest that schizophrenic language is characterized by a tendency to repetition of words and perhaps also of phrases and that these repetitions are found at shorter intervals than in normal speech.

**Studies in Redundancy and the Perception of Language**

As mentioned earlier, redundancy in the language is viewed in information theory as an aid in comprehensibility. There is a large body of evidence indicating that redundancy in language aids in later recall (Miller & Selfridge, 1950) and in how easily it can be read (Weaver & Kingston, 1963). The interpretation is that the greater efficiency of processing highly redundant passages can be explained as follows: words that are missed in perception or forgotten in the recall task are:

... interpolated on the basis of the probabilities provided by perception or recall of the surrounding words. In this sense, perception and recall include processes very similar to those by which a reader decides what words to enter when completing a language sample that has been mutilated for cloze analysis ... (Maher, 1972, p. 6).

Research comparing performance of normal and schizophrenic Ss indicate that in general schizophrenics benefit less from redundancy in the perception of speech than
normals do. Lawson, McGhie and Champan (1964) found that schizophrenics improve less than normals from an increase in redundancy of the passage in a recall test. In this study Lawson et al. created redundancy by constructing passages based upon increasingly longer strings of words with suitable transitional probabilities. Levy and Maxwell (1968) and Raeburn and Tong (1968) using the same procedure found that acute schizophrenics were impaired in their ability to benefit from increased contextual cues. Lewinsohn and Elwood (1961) found results contrary to the Lawson et al. (1964) study for acute schizophrenics but were in agreement for chronic schizophrenics. Forrest, Hay and Kushner (1969) were unable to replicate the Lawson et al. (1964) results and state that this discrepancy was probably due to the relation between Ss and Es in that Es had had no prior contact with Ss as they had in the Lawson et al. study.

Gerver (1967) found that schizophrenic Ss were inferior to normals in repeating sentences which varied as to grammatical correctness and meaningfulness. Schizophrenics' scores, however, were significantly aided by syntactic and semantic organization within the sentences to be recalled. Truscott (1970) investigated differential ability of schizophrenics and normals to recall groups of words ranging from normal sentences to random word strings. She found schizophrenic Ss inferior to normal Ss on all types, the greatest difference being for normal sentences. Schizophrenics did
not improve as dramatically on recall of normal sentences as the normal Ss did.

Salmon, Bramley and Presly (1967) found differences in performance on the Word-in-Context test (Heim & Watts, 1958) between thought-disordered and non-thought-disordered schizophrenics. Schizophrenics were classified as thought disordered or non-thought disordered on the basis of performance on the Repertory Grid Test (Bannister, 1960). The Word-in-Context test, similar to the cloze technique, requires S to infer the meaning of unfamiliar words from clues provided by the context of sentences in which the words are embedded. They report that thought-disordered patients were inferior to non-thought-disordered schizophrenics on this test, but that the differences in performance were not statistically significant. They did not obtain data from normal controls. The few studies (Honigfeld, 1963; Moroz & Fosmire, 1966; and Deckner, cited in Rosenberg & Koplin, 1968) on the performance of schizophrenics as guessers using the cloze technique give conflicting results. These studies will be discussed in greater detail in the next section.

That schizophrenics in general seem to profit less from redundancy and contextual cues has relevance to the Immediacy Hypothesis developed by Salzinger (1973). If, as Salzinger suggests, the more immediate stimuli in the environment are the ones the schizophrenic is attending to, it stands to reason that increase in contextual cues would
not benefit performance on these tasks as he would not be attending to the more distal cues in any case.

Information Redundancy and Research with the Cloze Procedure: Analysis of Comprehensibility

The cloze procedure was initially developed as a measure of readability (Taylor, 1953) and has since been adapted for the objective study of both normal and disturbed verbal behavior (for example, Feldstein & Jaffe, 1963; Moroz & Fosmire, 1966; Salzinger, Portnoy & Feldman, 1966; and Honigfeld, 1967). The adapted technique involves first tape recording S's speech and making a verbatim transcript of this recording. Samples of continuous speech transcript are then prepared for the cloze procedure by deleting every fifth word (usually) and replacing it with a blank. The text is then given to a panel of normal individuals who "rate" each copy by trying to guess the deleted words. The cloze score which is obtained is generally expressed as the percentage of correctly restored words, of the total number of words deleted, for the particular text. A panel cloze score is the mean cloze score obtained by all the raters for each text sample.

The cloze score is essentially a measure of the degree of redundancy in the text and has been shown to be a valid reflection of the comprehension of raters and comprehensibility of the text (Taylor, 1957; Rubenstein & Aborn, 1958; Silverman, 1972). Osgood and Sebeok (1954) have
stated that the cloze procedure is "... an index of the overall correspondence of commonality between the language systems of different individuals..." (p. 80).

The cloze procedure has been used in a number of different investigations. Osgood and Walker (1959) found that it was successful in differentiating suicide notes from control notes, the suicide notes having the greater redundancy (higher cloze score). Studies comparing normal Ss speech samples to Ss under the influence of LSD (Honigfeld, 1965; Cheek & Amarel, 1967) and psilocybin (Honigfeld, 1965) found the speech samples are less redundant with increasing dosages of the drugs, while Honigfeld (1965) found redundancy increases under the influence of epinephrine. Lower redundancy has been found in aphasics (Fillenbaum & Jone, 1962) and alcoholics (Cheek & Amarel, 1967).

Variations between raters and variations within raters were studied by Honigfeld and his associates. They found a relationship between style of cloze prediction and authoritarianism (Honigfeld, Platz & Gillis, 1965) but no relation between anxiety level and cloze performance (Platz & Honigfeld, 1965). Looking at the sources of variation in cloze scores, Amarel, Cheek, and Stierhem (1966) found that the only significant rater variables for normal Ss were the verbal score on the School and College Ability Test which was positively correlated with ability to predict schizophrenic and alcoholic speech and verbal association.
nonantonym popular score which was correlated negatively with ability to guess schizophrenic speech.

Characteristics of the verbal passages can also be a source of variation in the cloze score. Taylor (1957) noted that nouns, verbs, and adverbs were more frequently guessed right. Adjectives and prepositions were in a middle group. The work of Aborn, Rubenstein and Sterling (1959) is in essential agreement with the above findings. They found the following percentages correctly guessed: nouns, 25 percent; verbs, 37 percent; adjectives, 21 percent; adverbs, 32 percent; pronouns, 55 percent; and function words, 63 percent. Coleman and Blumenfeld (1963) found content words—nouns, verbs excluding auxiliaries and copulas, adverbs excluding those of degree, and adjectives excluding articles—(Fries, 1952)7 were predicted less well than function words. Feldstein, Rogalski and Jaffe (1966) found no significant differences in word frequency patterns in terms of the Thorndike and Lorge (1944) count of well and poorly predicted samples.

Cheek and Amarel (1968) have compared predictability of schizophrenic and alcoholic speech. They found, in agreement with Salzinger, Portnoy and Feldman (1964) that schizophrenics tend to drop in predictability as they continued to speak; whereas alcoholics would rise in predictability. They also found, however, that there was no significant difference between the predictability of alcoholic and schizophrenic speech using the first 10 words of
a continuous speech sample. This contrasts with the almost consistent results from other investigators (Salzinger, Portnoy & Feldman, 1964; Maher, 1972) who have found significant differences between normals and schizophrenics. Cheek and Amarel (1968) suggest the short speech sample and the fact that alcoholics are probably less coherent to account for this discrepancy. In analyzing their data, Cheek and Amarel offer some clues as to why schizophrenic speech may be harder to predict than normal speech. They found a greater proportion of content words in schizophrenic speech, which are poorly predicted in general. In addition they found that function words were even harder to predict than the content words in schizophrenic speech which led them to suggest that it is the structure rather than the content of schizophrenic speech which makes it less predictable. Rice (1970) in a study of the written language of schizophrenics reported that redundancy measured by cloze procedure was positively related to psychiatrists' clinical impressions of the degree of disorganization of the written material.

Salzinger, Portnoy and Feldman (1964) compared 200-word samples of speech taken from schizophrenic patients with those of a control group of physically ill hospital patients matched for age, sex, education, and ethnic background. College students were the "raters" in the cloze procedure. Of the 11 male pairs compared, all schizophrenics were more difficult to understand; this effect was more
pronounced in the second 100 words than in the first 100 words. Salzinger, Portnoy and Feldman (1966) confirmed these findings in a later study with acute schizophrenics and found decreasing redundancy was correlated with increasing stay in the hospital (p. 47). They stated that patients who communicate effectively approximately one week after coming to the hospital were able to be discharged earlier than those who communicated poorly at that time.

Bertoch (cited in Maher, 1972) found that patients who exhibited the most severe thinking disorder during an interview were least redundant when composing verbal responses to ambiguous pictorial stimuli, but were most redundant when composing responses to relatively unambiguous stimuli. This finding was interpreted to mean that when a patient with a thought disorder must talk about clearly defined events he is much more conventional and stereotyped than the normal control. When he is required to communicate about ambiguous events, he is more disorganized and less redundant than the normal control. Hart and Payne (1973) report that the only psycholinguistic measure which correlated with measures of overinclusive thinking was the cloze score. A significant majority of those patients exhibiting at least two abnormal scores on three tests of overinclusive thought disorder were found to have lower cloze scores than those patients without indications of overinclusive thinking.
Silverman (1972, 1973) compared fourth and fifth word deletions for schizophrenic and non-schizophrenic speech samples. He related that both methods could distinguish between the samples with schizophrenics having lower scores, and that the fourth word deletions were a more sensitive measure. He hypothesized that inappropriate repetition of words could account for this communication deficit in schizophrenics. In his 1973 study, he found that using fourth word deletions there was a very significant correlation between the cloze score and the type-token ratio, supporting the hypothesis that inappropriate repetition may be the basis of the speech deficit.

The Immediacy Hypothesis

Salzinger (1973) and his colleagues (Salzinger et al., 1970) have presented a relatively uncomplicated hypothesis about schizophrenia. Stated in its most general form, it postulates that schizophrenic behavior is primarily controlled by stimuli which are immediate in the environment. According to Salzinger (1973) this hypothesis can explain the fact that schizophrenic behavior is often, but not always, controlled by irrelevant stimuli, for example as in a sorting task (Chapman, 1956), by showing that immediate stimuli are frequently, but not always, irrelevant. Data from areas other than language have lent support to this hypotheses. For example, in a weight judging situation, Salzinger (1957) found that a schizophrenic S is more
influenced by an anchor weight immediately preceding the
weight to be judged and is less influenced by an anchor
weight which is only a member in a series of trials (Wurster,
1965). In learning experiments, one would expect a con-
tinuous schedule of reinforcement to result in equally rapid
conditioning for normal Ss and schizophrenic Ss, but would
expect faster extinction in the schizophrenic because of the
absence of the immediate reinforcing stimulus. These expec-
tations have been confirmed (Dinoff et al., 1960; Salzinger
& Pisoni, 1961). Control by immediate stimuli would predict
little generalization from one situation to another as
Morris et al. (1963) found. In a constancy experiment, the
schizophrenic's response would be predicted to be controlled
more by retinal image than by actual object, since the for-
mer is the more immediate stimulus; and hence, a defect in
object constancy would result (Weckowicz, 1964).

Salzinger et al. (1970) have suggested that the
immediacy hypothesis can be helpful in explaining some of
the data from research on schizophrenic language. They
first applied the hypothesis to studies which showed that
the speech of schizophrenics is less communicative than that
of normals (Salzinger et al., 1964, 1966). The speech of
the schizophrenic which followed E's instructions was less
different from that of normals than the speech which oc-
curred later, without E's instructions as an immediate
stimulus. This difference was also explained in terms of
response-produced stimuli. It was hypothesized that the
general defect in communicability of schizophrenic speech "could be attributed to the relatively short span of neighboring responses over which response-produced stimuli exert control" (Salzinger et al., 1970, p. 259). That is, only the most immediate words are related to each other by response-produced stimuli, but in normal speech, both immediate and remote words relate to one another.

To relate this hypothesis more explicitly to verbal behavior of schizophrenics, Salzinger postulated that if it is true that schizophrenic verbal behavior is primarily controlled by stimuli which are close to a given response, then a given verbal response should be related primarily to the immediately surrounding words and very little to words farther removed. In other words, the schizophrenic utterance is less influenced by the total context of the previous utterances than is the case with normal Ss. To test this, Salzinger et al. (1970) had 230 undergraduate college students "rate" excerpts from the language of ten schizophrenics and ten matched control Ss. They found that increasing context enabled the raters to predict with higher accuracy the language of the normal Ss but not that of schizophrenic Ss. The raters were not able to predict schizophrenic speech with brief context any better than they could normal speech. Maher (1972) interprets this last finding as not supporting the immediacy hypotheses. Salzinger et al. (1970) conclude that the data do support the immediacy hypothesis in that normal speech samples are generally more sensitive
to increases in context, suggesting that in normal speech words farther removed from the word to be guessed are related to that word. For schizophrenics, the response-produced stimuli are related primarily to the immediately neighboring words and less to more remotely situated words. This type of production of speech may be related to other defective behavior in schizophrenia, such as word definitions and proverb interpretations where connections over short spans may be producing the "concrete reasoning" (Chapman, Chapman, & Miller, 1964).

The immediacy hypothesis is not in contradiction to many of the current theories of schizophrenic behavior. For example, the Cromwell and Dokecki (1968) disattention interpretation is similar in many respects to the immediacy hypothesis. According to Cromwell and Dokecki, the critical dysfunction is the schizophrenic's inability to disattend stimuli, making it impossible for him to distinguish relevant from irrelevant stimuli. They stress the importance of current and immediately recent events. Cohen's self-editing theory (Cohen, Nachmani, & Rosenberg, 1974) suggests that the difficulty in schizophrenic language is the inability of the schizophrenic to reject an inappropriate association once elicited in order to recycle and search for a more appropriate one (Rosenberg & Cohan, 1964, 1966; Cohen & Camhi, 1967; Smith, 1970). Cohen and his associates have developed a perseverative-chaining model of schizophrenic language in which the emphasis is put on an inability to
disattend (Cromwell & Dokecki) from immediate (Salzinger) stimuli. Once he fails to edit,

... he not only begins perseverative chaining, but he also ceases to process the relevant discriminative information. It is as if once he discovers his dominant association does not meet the task demand, he "pulls the window shades down" on the outside world and starts associating to his own associations . . . (Cromwell, 1975).

Cohen, Nachmani, & Rosenberg (1974) suggest that their findings might not be expected from paranoid schizophrenics who do not tend to perseverate as much.

It would seem that the best test of hypotheses concerning the associative processes in schizophrenic language would be one involving activity on the part of the schizophrenic himself. Very little research has been done using schizophrenics as raters (or guessers) in the cloze procedure. Honigfeld (1963) compared the ability of thirty schizophrenic Ss with thirty-two normal Ss to guess words omitted from one schizophrenic speech sample, one psilocybin speech sample, and one newspaper article. He was testing the notion that the speech of schizophrenics is more easily understood by other schizophrenics than by normals. He found that the mean cloze score for the schizophrenic group was lower than the mean cloze score for the normals on all three samples, and that the schizophrenics were not significantly better in predicting the schizophrenic speech sample. It is interesting to note that the cloze scores for both schizophrenics and normals were higher for the schizophrenic speech sample, followed by the psilocybin sample, followed
by the newspaper article. As Honigfeld notes, these data must be viewed with caution. The particular schizophrenic speech sample used was not noticeably atypical or unique in nature and the schizophrenic guessers were not acutely disturbed. An additional point to be made about this study is that only one sample for each category was used and it may not have been representative.

Moroz and Fosmire (1966), testing the same idea that schizophrenics may be able to understand schizophrenic language better than normals, obtained a transcript from ten new patients in a state hospital with the diagnosis of schizophrenia. They had six male patients in a VA hospital with the diagnosis of schizophrenia and six normal controls matched for age, education and intelligence complete a cloze analysis of the schizophrenic speech samples. Results showed a significant difference in comprehensibility of the speech samples, but no significant difference in the levels of comprehension of the two groups. The mean cloze scores for each sample were amazingly similar for normals and schizophrenic guessers, four of them being exactly equal and the rest only a few hundredths of a percent difference. Failure to find differential ability may have been related to several factors as Moroz and Fosmire point out. The schizophrenic Ss who were guessers were not seriously disorganized at the time of the experiment and the samples of schizophrenic language may not have been representative of "schizophrenic language."
One further study along these lines was carried out by Deckner (cited in Rosenberg & Koplin, 1968) to test a theory devised by Chapman, Chapman and Miller (1964) explaining the misinterpretation and misuse of words by schizophrenics.

The theory states that schizophrenics' misinterpretations of the meanings of words arise in part from mediation of overt responses to words by their strongest meaning responses with a relative neglect of their weaker meaning responses, while the interpretation of words by normal persons reflects the use of the weaker as well as the stronger meaning responses (Chapman, Chapman, & Miller, 1964, p. 53).

According to Cromwell and Dokecki (1968, p. 240):

Schizophrenics tend to respond to incorrect but associated words or objects that are part of the stimulus field immediately prior to the response. They are not as prone to err when these distractors are not immediately present, regardless of the strength of meaning response. Further, the strength of the association of the distractors, when they are present, influences the degree to which they are likely to elicit inappropriate responses from schizophrenics.

In order to test the hypothesis that schizophrenics are less able to utilize weak contextual cues than normals, Decker used thirty-six schizophrenics dichotomized with respect to good versus poor morbid adjustment and eighteen normals comparable in age and intelligence to the good-poor schizophrenic groups. Brief samples of normal written material, with every fifth, eighth, and tenth words deleted, were presented to the groups for cloze analysis. The more words that were deleted, the weaker the context became by definition. Although he found that the results of the schizophrenic groups were inferior to those of the normal groups and that the performance of all groups decreased with
increasing delation, the results of the schizophrenics closely paralleled those of the normals and did not get progressively worse to a greater extent than the normals. Deckner interpreted this to mean the data did not support the hypothesis. According to the immediacy hypothesis, however, because schizophrenics would, in any case, be attending to immediate stimuli, it is not expected that they would get progressively worse with weaker contextual cues.

One of the important shortcomings in psycholinguistic research into schizophrenic language is that for the most part schizophrenia is taken as a univariate clinical entity and subclassification is not controlled for. Schizophrenics very often differ greatly on several dimensions. Research on perceptual and stimulus input factors (Harris, 1957; Silverman, 1964; Venables, 1964; Davis, Cromwell & Held, 1966; Cromwell & Dokecki, 1968; and Wahl & Wishner, 1962) consistently reports evidence that schizophrenics differ especially as a function of premorbid adjustment (process vs. reactive dimension), chronicity, and paranoid vs. nonparanoid symptomatology. Shakow (1963) and Venables (1964) have cautioned against arbitrary oversimplified subclassifications based on the above dimensions; however, reasonable attempts at subclassification have reduced within-group variability (Cromwell & Dokecki, 1968).
Statement of the Problem

More data are needed concerning the psycholinguistic properties of schizophrenic language both from the standpoint of production and perception of speech if reliable clinical diagnostic and prognostic measures are to be developed. More research into the language of schizophrenia is needed with the aim of developing a theory of schizophrenic behavior which will point toward more effective treatment methods (Salzinger, 1973). Conflicting results in the literature on schizophrenic language indicate the advisability of controlling for subclassification of schizophrenia in research.

Research in cloze analysis has tended to focus on the judgment of normal Ss of schizophrenic speech; it is on the basis of this judgment that theories of the associative properties of schizophrenics are tested with this technique. It seems that a great deal of valuable information has been neglected in not utilizing schizophrenic judgments in a systematic and more comprehensive fashion in cloze analysis. It is the purpose of this study to use a cloze analysis of schizophrenic and normal speech with schizophrenic and normal guessers to test Salzinger's immediacy hypothesis as well as the notion that schizophrenic individuals should be able to understand schizophrenic speech better than normals can. This latter idea is consistent with that part of information theory which states that cloze analysis is a most accurate reflection of comprehension.
when one assumes that the verbal habits of the guesser are statistically closest to those of the author generating the text (Shannon, 1951; Miller, 1954). If there is commonality in the process of thought disorder of schizophrenia, as is implied in current theories of schizophrenia (for example, Cromwell & Dokecki, 1968; Salzinger, 1973; Cohen et al., 1974), then one can anticipate that schizophrenic guessers would be able to predict (comprehend) schizophrenic utterances better than normal utterances and further, that they would predict schizophrenic utterances better than normal Ss would.

Studies concerning the language behavior of schizophrenics have varied as to whether or not they found acute or chronic schizophrenics to have the more disturbed language (Lawson, McGhie & Chapman, 1964; Salzinger, Portnoy & Feldman, 1966; Cohen & Camhi, 1967; Levy & Maxwell, 1968; Raeburn & Tong, 1968; Pavy, Grinspoon & Shader, 1969; Reilly, Harrow & Tucker, 1973). In a recent study, Reilly, Harrow and Tucker (1973) found that acute schizophrenics in their first weeks of hospitalization tend to be more disorganized in their speech than those in their seventh week of hospitalization. In order to control for the acute-chronic variable and to obtain samples of disorganized schizophrenic speech, schizophrenics within their first week of hospitalization were used as Ss.

Another dimension which has shown to be relevant in differentiating schizophrenic perception (Shakow, 1963;
Silverman, 1964; Witkin, 1965) and thinking disturbances (Mittenecker, cited in Maher, 1972; Wahl & Wishner, 1972) is the paranoid-nonparanoid differentiation. Wahl and Wishner (1972) have found that paranoid schizophrenics do not manifest the same degree of cognitive deficiency as do nonparanoid schizophrenics. Their findings were corroborated by Hamlin and Lorr (1971). Wahl and Wishner (1972) suggest that the cognitive disturbance in paranoid schizophrenics is more evident in the content of thought rather than in the structure of thought. To test the possibility that paranoid schizophrenics have less structural thought disturbance than nonparanoids, a comparison was made between paranoid and nonparanoid schizophrenics' and normal Ss' production and perception of language. Measures used to assess degree of language disturbance were the cloze scores for correct number of exact words guessed and the correct number of word-classes guessed. As Maher (1972) has noted, the latter category, while less frequently encountered, can be considered to be an indicator of a greater degree of thought disorganization.

Finally, as a more specific measure of the influence of context on word choice, eight samples representing increasing orders of approximation to standard English were chosen from the Miller and Selfridge (1950) study. They developed these samples by having Ss guess the best word to follow when presented with one stimulus word (first order approximation), with two stimulus words (second order
approximation) and so on. Using these word strings, which ranged from random word strings to a standard English text, they investigated the effect of redundancy (or increasingly meaningful context) on recall and found greater recall with greater redundancy.

**Hypotheses**

1. Analysis of cloze scores for correct number of exact words: Cloze Score I.
   a. Normal Ss will be able to predict (obtain higher cloze scores for) normal speech better than paranoid schizophrenic speech. They will predict paranoid schizophrenic speech better than that of nonparanoid schizophrenic patients.
   b. Paranoid schizophrenic patients will do more poorly in predicting normal speech than normal Ss but will do better than normal Ss in predicting paranoid schizophrenic speech and that of nonparanoid schizophrenic patients.
   c. Nonparanoid schizophrenic patients will predict normal and paranoid schizophrenic patients' speech more poorly than normal and paranoid schizophrenic Ss, but will be able to predict speech of nonparanoid schizophrenic Ss better than the other two groups will. They will predict speech of nonparanoid schizophrenic Ss best, then that of paranoid schizophrenic Ss, then that of normal Ss.
2. Analysis of cloze scores for number of correct grammatical class: Cloze Score II.
   a. Normal Ss should be able to predict grammatical class for normal and paranoid schizophrenic speech better than for nonparanoid schizophrenic speech.
   b. Paranoid schizophrenic Ss should be able to predict grammatical class for normal and paranoid schizophrenic speech better than nonparanoid schizophrenic speech.
   c. Nonparanoid schizophrenic Ss should be able to predict grammatical class for nonparanoid schizophrenic speech better than for paranoid schizophrenic and normal speech.

3. Analysis of number correct for all orders of approximation.
   a. Normal Ss will guess significantly more correct words on the higher order approximations than they do on lower order approximations.
   b. Paranoid schizophrenics and nonparanoid schizophrenics will not guess significantly more correct words on the higher order approximations than they do on lower order approximations.
METHOD

Subjects

Speakers. Speech samples used for the two schizophrenic groups were taken from verbatim transcripts of interviews with patients made during their first week of hospitalization in a state mental hospital. Patients were told that the transcripts would be used as part of a research project and that if they chose, they could decline to participate. All Ss were willing to participate. Ss were assured that identifying data would be disguised to insure confidentiality of the participants. Speech samples were randomly selected from two pools of thirty-five transcripts each. One pool consisted of paranoid schizophrenic transcripts and the other of nonparanoid schizophrenic transcripts. Speakers chosen for the first group were ten male paranoid schizophrenics ranging in age from nineteen to thirty-eight years with a mean age of 31.0 years. Their mean number of years of formal education was 11.4. Speakers for the second group were ten male nonparanoid schizophrenics ranging in age from twenty-six to fifty-seven years with a mean age of 37.5 years. Mean number of years of formal education for this group was 10.9.

Clinical diagnoses were based on admitting diagnosis and subsequent confirmation by the treatment team (clinical
psychologist, psychiatrist, psychiatric residents, clinical psychology intern, and social worker) working with the patients. Demographic data were obtained from the official case history in each patient's chart. Ss were receiving tranquilizing medication at maintenance levels and the effect of the medication was judged by the staff psychiatrist and psychologist working with the patients not to interfere with Ss' verbal functioning. Number of previous hospitalizations ranged from zero to three in both groups.

Normal speech samples were verbatim transcripts of interviews with normal males which have been published by Terkel (1972). To collect these interviews, Terkel interviewed a cross section of the working population of the United States and invited them to talk about their jobs, how they felt about their jobs and their lives. Interviewees knew they were being recorded and that confidentiality would be maintained at their request. These normal Ss had no history of psychiatric hospitalization. Ss were chosen who had worked continuously for five or more years. Ss in this group were ten males ranging in age from twenty to forty-eight years with a mean age of 33.0 years. Mean number of years of formal schooling for this group was 10.5. All speaker groups were comprised of members of lower-middle socioeconomic class and experimental and control groups were matched for ethnic and racial status.
Raters. Three groups of ten Ss each served as raters. Paranoid schizophrenic and nonparanoid schizophrenic groups were drawn from a VA psychiatric inpatient population in their first month of hospitalization. Clinical diagnosis was made on the basis of agreement between staff psychiatrists and clinical psychologists working with the patients. Permission to involve the patients in this study was obtained from the ward administrator prior to initial contact with the patients. Ss were asked to participate in a research project on language and were given the opportunity to decline if they so chose. Ss who indicated interest in the outcome of the study were told they would be provided with a summary of the results at the conclusion of the study. Demographic data were obtained from the official case history in the S's chart and all Ss were assured that confidentiality would be protected. Ss were receiving tranquilizing medication at maintenance levels. Effects of medication were not such as to interfere with Ss' reading or writing on this task as judged by the staff psychiatrist or psychologist working with the patients, and the patients' self-reports. Subjects in the first group were ten male paranoid schizophrenics ranging in age from twenty-one to forty years with a mean age of 31.2 years. Mean number of years of formal schooling was 11.5. Subjects in the second group were ten male nonparanoid schizophrenics ranging in age from eighteen to fifty years with a mean age
of 33.4 years. Mean number of years of formal schooling was 11.1.

The third, normal, group was randomly drawn from a group of male VA patients hospitalized for nonpsychiatric reasons who had no previous record of psychiatric hospitalization. Procedure in securing permission from the ward administrator and subject cooperation was the same as for psychiatric Ss. Ss in this group ranged in age from nineteen to fifty-seven years with a mean age of 35.9 years. Mean number of years of formal schooling for this group was 11.2. All rater groups were comprised of members of lower-middle socioeconomic class and groups were matched for ethnic and racial status.

Procedure

Speakers. Speech samples for the schizophrenic groups were obtained within one week of hospitalization during an interview in which a staff clinical psychologist and a staff psychiatrist invited the patient to talk about what brought him to the hospital and some of the problems he had been having. Ss knew they were being tape recorded and that all material was confidential. The first 200-word continuous speech sample for each S was chosen and of that sample the last one hundred words were prepared for cloze analysis. Speech samples for the normal group were selected from the work of Terkel (1972). Permission was obtained from Random House to reproduce parts of the material in the book. The
first 200-word continuous speech sample for each S was chosen and of that sample the last one hundred words were prepared for cloze analysis.

Raters procedure for cloze analysis. The last one hundred words in a speech sample for each of the speakers were prepared for cloze analysis by "E's" deleting every fifth word with a space of uniform length substituted. Whenever the fifth word was a proper noun or a number, the next word was deleted with a corresponding number of words added to the passage so that the last, 20th blank was always followed by four words. All punctuation marks were removed. Booklets in which passages from the three groups were uniformly distributed were compiled with a cover sheet for instructions and an identifying code number (see Appendix A). Each rater rated one speech sample from each member of the three speaker groups, making a total of thirty samples. For each sample he was required to fill in twenty blanks, making a total of six hundred blanks in the entire booklet. In addition to the speech samples, an extra page was added to the booklet containing eight examples from the Miller and Selfridge (1950) article. Ss were asked to fill in the blanks with whatever word seemed to fit best, just as in the cloze procedure.

Raters were given the booklet in group sessions and the following instructions (which appeared on the cover sheet of the booklet) were read:
This is a study of language. On each of the pages is a sample of a person's speech. All punctuation has been removed. You will notice that every so often there is a blank. Every fifth word that was spoken has been left out. Your job is to guess what word you think would make the most sense and write that word in the blank. The missing words are not numbers or names. Do the best you can. It is very important that you fill in all the blanks. Work as quickly as you can. You will probably not be able to finish the booklet at one time so at the end of one hour, mark your place and you may finish at the next appointed time.

Ss were told that total working time was not to exceed three hours.
RESULTS

The first measure tabulated was number of correct words predicted by raters for all speakers. The second measure was obtained by comparing the grammatical class of each predicted word with that of the original spoken word and tabulating the number of correct grammatical class matches. The breakdown of grammatical classes was as follows: noun, pronoun, verb, preposition, conjunction, adjective (including articles) and adverb. A two factor 3 x 3 analysis of variance with repeated measures was carried out on each dependent variable:

1. number of correct exact words
2. number of correct grammatical classes.

Independent variables were the following:

1. Clinical diagnostic category of Ss speaking
   a. normal
   b. paranoid schizophrenic
   c. nonparanoid schizophrenic.

2. Clinical diagnostic category of Ss rating the speech samples
   a. normal
   b. paranoid schizophrenic
   c. nonparanoid schizophrenic.

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The third measure was the number of correct words predicted for each order of approximation and a two way analysis of variance was calculated using per cent correct responses of the three rater groups to each of the orders of approximation.

Performance of Ss

Of all Ss approached to participate in this study only six refused. These patients were in an agitated paranoid state and refused on the grounds that they were unwilling to reveal any information about themselves. All other Ss were cooperative after an initial discussion of confidentiality and the purpose of the study. Although total time to complete the booklet varied, all Ss finished within three hours and most took only two and one-half hours. There were no apparent differences in the mean completion times among the three groups. All Ss worked one hour during the first session and finished the booklet the following afternoon.

Ss who were interested in the outcome of the study met with the investigator for a short discussion of the results which centered on comprehensibility of the speech samples without mention of diagnostic categories.

Analysis of Correct Word:

Cloze Score I

As can be seen in Table 1 there was a significant difference among rater groups in their ability to predict
the correct word when responses to all speech samples were averaged. A post anova Tukey test indicated that normal Ss predicted significantly more correct words than did paranoid schizophrenic Ss or nonparanoid schizophrenic Ss. Paranoid schizophrenics chose more correct words than nonparanoid schizophrenics but this difference was not significant with the Tukey (see Table 2). When the responses of rater groups were averaged, significantly more correct words were guessed for normal and paranoid schizophrenic speech than for nonparanoid schizophrenic speech. While more correct words were selected for normal speech than for paranoid schizophrenic speech, this difference was not statistically significant (see Tables 1 and 3).

Table 1
Analysis of Variance for Correct Word Obtained by Rater Groups from Speaker Groups

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MF</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rater</td>
<td>2</td>
<td>90373.09</td>
<td>45186.54</td>
<td>71.17</td>
<td>.001</td>
</tr>
<tr>
<td>Subject (Rater) = Error (a)</td>
<td>27</td>
<td>17141.63</td>
<td>634.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker</td>
<td>2</td>
<td>2286.16</td>
<td>1143.08</td>
<td>36.23</td>
<td>.001</td>
</tr>
<tr>
<td>Rater x Speaker</td>
<td>4</td>
<td>2306.84</td>
<td>576.71</td>
<td>18.23</td>
<td>.001</td>
</tr>
<tr>
<td>Error (b)</td>
<td>54</td>
<td>1703.67</td>
<td>31.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>89</td>
<td>113811.39</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Table 2
Mean Number Correct Words and Correct Grammatical Classes Guessed for all Speaker Groups

<table>
<thead>
<tr>
<th>Rater Group</th>
<th>N</th>
<th>Correct Word</th>
<th>Correct Grammatical Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>30</td>
<td>88.93</td>
<td>156.50</td>
</tr>
<tr>
<td>Paranoid Schizophrenia</td>
<td>30</td>
<td>26.37</td>
<td>70.27</td>
</tr>
<tr>
<td>Non-Paranoid Schizophrenia</td>
<td>30</td>
<td>17.87</td>
<td>59.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tukey critical value = 27.18</td>
<td>Tukey critical value = 40.14</td>
</tr>
</tbody>
</table>

Table 3
Mean Number Correct Words and Correct Grammatical Classes Obtained by Rater Groups for Each Speaker Group: General Comprehensibility of Speech Samples

<table>
<thead>
<tr>
<th>Speaker</th>
<th>N</th>
<th>Correct Word</th>
<th>Correct Grammatical Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>30</td>
<td>50.23</td>
<td>100.33</td>
</tr>
<tr>
<td>Paranoid Schizophrenia</td>
<td>30</td>
<td>45.00</td>
<td>97.57</td>
</tr>
<tr>
<td>Non-Paranoid Schizophrenia</td>
<td>30</td>
<td>37.93</td>
<td>88.33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tukey critical value = 6.05</td>
<td>Tukey critical value = 9.48</td>
</tr>
</tbody>
</table>
As indicated in Table 1, there was a significant speaker x rater interaction for number of correct words guessed. From Table 4 it can be seen that normal raters obtained a significantly higher cloze score for normal speech than for paranoid schizophrenic speech. Normal Ss also obtained a significantly higher cloze score for paranoid schizophrenic speech than for nonparanoid schizophrenic speech. Paranoid schizophrenic Ss guessed significantly more correct words for the paranoid speech than for nonparanoid speech. Paranoid schizophrenic Ss also obtained a slightly higher but nonsignificant cloze score for paranoid speech than for normal speech.

Nonparanoid schizophrenic Ss obtained almost identical cloze scores for paranoid and normal speech and an only slightly higher cloze score for nonparanoid speech (see Figure 1).

Table 4
Mean Number Correct Words Guessed by Each Rater Group for Each Speaker Group

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Normal</th>
<th>Paranoid Schizophrenia</th>
<th>Non-Paranoid Schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rater Normal</td>
<td>103.60</td>
<td>87.10</td>
<td>76.10</td>
</tr>
<tr>
<td>Paranoid Schizophrenia</td>
<td>29.30</td>
<td>30.50</td>
<td>19.30</td>
</tr>
<tr>
<td>Non-Paranoid Schizophrenia</td>
<td>17.80</td>
<td>17.40</td>
<td>18.40</td>
</tr>
</tbody>
</table>

Tukey critical value = 6.05
Figure 1

Mean Cloze Score I for Each Rater Group
Cloze scores of normal Ss were significantly higher on normal, paranoid schizophrenic and nonparanoid schizophrenic speech samples than were cloze scores of paranoid schizophrenic Ss and nonparanoid schizophrenic Ss. Normal Ss predicted correct words for all three speaker groups better than either of the other rater groups (see Figure 1). Paranoid schizophrenic raters obtained cloze scores significantly higher than those of nonparanoid schizophrenics on both normal and paranoid schizophrenic speech. Their cloze scores were slightly higher than the cloze scores of nonparanoid schizophrenics on nonparanoid schizophrenic speech but this difference was not significant. In general normal Ss obtained higher cloze scores over all speaker groups, followed by paranoid schizophrenic Ss; and lastly, nonparanoid schizophrenic Ss obtained the lowest cloze scores over all speaker groups.

**Analysis of Correct Grammatical Class: Cloze Score II**

As Table 2 and Table 5 indicate, normal Ss scored significantly higher over all speech samples on correct number of grammatical classes than did paranoid or nonparanoid schizophrenic Ss. Paranoid schizophrenic Ss scored higher than nonparanoid schizophrenic Ss, but this difference was not significant using a Tukey critical value. Averaging responses from all raters, number of correct grammatical classes guessed was significantly higher for normal and paranoid schizophrenic speech than for nonparanoid
schizophrenic speech. Cloze score II for normal speech was only slightly greater than that for paranoid schizophrenic speech (see Table 3).

Table 5

Analysis of Variance for Correct Grammatical Class Obtained by Rater Groups from Speech Samples

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rater</td>
<td>2</td>
<td>168609.62</td>
<td>84304.81</td>
<td>60.86</td>
<td>.001</td>
</tr>
<tr>
<td>Subject (Rater) = Error (a)</td>
<td>27</td>
<td>37401.67</td>
<td>1385.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaker</td>
<td>2</td>
<td>2521.76</td>
<td>1260.88</td>
<td>16.33</td>
<td>.001</td>
</tr>
<tr>
<td>Rater x Speaker</td>
<td>4</td>
<td>963.98</td>
<td>240.99</td>
<td>3.13</td>
<td>.05</td>
</tr>
<tr>
<td>Error (b)</td>
<td>54</td>
<td>4168.93</td>
<td>77.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>89</td>
<td>213665.96</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There was a significant speaker x rater interaction for cloze score II (see Table 5). Normal raters obtained significantly higher cloze scores for normal speech than for nonparanoid schizophrenic speech. Although normal Ss' cloze scores were higher on normal speech than on paranoid schizophrenic speech, the difference was not significant. Paranoid schizophrenic Ss obtained significantly higher cloze scores on normal and paranoid schizophrenic speech than on nonparanoid schizophrenic speech. They also obtained higher cloze scores on normal speech than on paranoid schizophrenic speech but this difference was not significant. For the
nonparanoid schizophrenic raters, there was very little difference among cloze scores for the three speaker groups. Their cloze score was highest for paranoid schizophrenic speech, then normal speech and lowest for nonparanoid schizophrenic speech (see Table 6).

Table 6
Mean Number Correct Grammatical Classes Guessed By Each Rater Group for Each Speaker Group

<table>
<thead>
<tr>
<th>Speaker Group</th>
<th>Normal</th>
<th>Paranoid Schizophrenia</th>
<th>Non-Paranoid Schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>163.80</td>
<td>157.90</td>
<td>147.80</td>
</tr>
<tr>
<td>Paranoid Schizophrenia</td>
<td>78.60</td>
<td>73.50</td>
<td>58.70</td>
</tr>
<tr>
<td>Non-Paranoid Schizophrenia</td>
<td>60.10</td>
<td>61.30</td>
<td>58.50</td>
</tr>
</tbody>
</table>

Tukey critical value = 9.48

Normal Ss obtained significantly higher cloze scores on each of the three speaker groups than did paranoid or nonparanoid schizophrenic Ss. Paranoid schizophrenic Ss guessed significantly more correct grammatical classes on normal and paranoid schizophrenic speech than did nonparanoid schizophrenic Ss. Their cloze score for nonparanoid schizophrenic speech was almost identical to that of the nonparanoid schizophrenic Ss (see Figure 2). In general, cloze scores for correct grammatical class paralleled those for...
Figure 2

Mean Cloze Score II for Each Rater Group
correct exact word. For all rater groups cloze scores for correct grammatical class were greater than those for correct exact word. Percentage increase of correct grammatical class (cloze score II) over correct exact word (cloze score I) was greater for nonparanoid schizophrenic Ss than for paranoid schizophrenic Ss, which in turn was greater than that of normal Ss. All three groups had the least difference between cloze score I and cloze score II on speech samples from their corresponding diagnostic group (see Table 7).

Table 7

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Normal</th>
<th>Paranoid Schizophrenia</th>
<th>Non-Paranoid Schizophrenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>60</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Paranoid Schizophrenia</td>
<td>170</td>
<td>140</td>
<td>200</td>
</tr>
<tr>
<td>Non-Paranoid Schizophrenia</td>
<td>230</td>
<td>250</td>
<td>220</td>
</tr>
</tbody>
</table>

Deleted words for each of the three speaker groups were divided into content words or function words plus pronouns (Fries, 1952). All groups had more content words than function words deleted. Normal speakers had 112 content words and 78 function words. Paranoid schizophrenic and
nonparanoid schizophrenic speakers had 105 content words and 95 function words each.

**Analysis of Correct Word for Each Order of Approximation**

Overall, rater groups averaged a higher percentage correct on samples from the seventh order of approximation (33 percent) and text selection (30 percent) followed by the second order of approximation (27 percent) producing a significant order main effect (see Table 8). Normal Ss guessed a greater number of correct words overall, followed by paranoid schizophrenic Ss, then nonparanoid schizophrenic Ss. There was a significant rater x order interaction. Normal Ss scored significantly higher on the seventh order of approximation and text than they did on lower order approximations. Paranoid schizophrenic Ss did not present a clearly defined pattern of response. Their percent correct responses were distributed over five orders of approximation including the highest three levels. Non paranoid schizophrenics responded most accurately to levels two, three and seven (see Table 9).
Table 8
Analysis of Variance for Correct Word Guessed by Rater Groups from Orders of Approximation

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rater</td>
<td>2</td>
<td>0.70</td>
<td>0.35</td>
<td>3.27</td>
<td>.05</td>
</tr>
<tr>
<td>Subject (Rater) = Error (a)</td>
<td>27</td>
<td>2.89</td>
<td>0.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order</td>
<td>7</td>
<td>4.23</td>
<td>0.60</td>
<td>6.96</td>
<td>.01</td>
</tr>
<tr>
<td>Rater x Order</td>
<td>14</td>
<td>4.23</td>
<td>0.30</td>
<td>3.48</td>
<td>.01</td>
</tr>
<tr>
<td>Error (b)</td>
<td>189</td>
<td>15.41</td>
<td>0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>239</td>
<td>28.46</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9
Mean Percentage Correct Words Guessed by Rater Groups for Each Order of Approximation

<table>
<thead>
<tr>
<th>Rater</th>
<th>Order of Approximation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Normal</td>
<td>0</td>
</tr>
<tr>
<td>Paranoid Schizophrenia</td>
<td>0</td>
</tr>
<tr>
<td>Non-Paranoid Schizophrenia</td>
<td>0</td>
</tr>
</tbody>
</table>
DISCUSSION

The processes of encoding and decoding information as described in communication theory elucidates the results obtained in this study. What has been measured here are the decoding abilities of the rater groups, that is, their ability to comprehend and interpret messages sent from other sources. In addition, a measure of encoding abilities of speaker groups, or their ability to transform their intentions into signals in the culturally accepted mode, has been obtained (Osgood & Sebeok, 1954). The cloze score is both a measure of comprehension of raters and comprehensibility of speech samples (Taylor, 1957; Rubenstein & Aborn, 1958; and Silverman, 1972).

Hypotheses mentioned earlier in this paper imply that there may be language subsystems for different diagnostic categories and that encoding and decoding within the subsystem may be easier than across subsystems. For example, if one were diagnosed a paranoid schizophrenic, it would be easier to receive and send messages with another paranoid schizophrenic than with a nonparanoid schizophrenic, or that normal Ss would be able to communicate better among themselves than among paranoid schizophrenics.
Hypothesis I. Cloze Score I

1. Results support the hypothesis that normal Ss would be able to predict (decode) normal speech better than paranoid schizophrenic speech and paranoid schizophrenic speech better than nonparanoid schizophrenic speech. If one considers the cloze score to be an index of commonality between language systems as Osgood suggests (1954), this finding indicates that there is a quantitative difference between normal language, paranoid schizophrenic language and nonparanoid schizophrenic language when these systems are decoded by normal Ss. And further, that paranoid schizophrenic speech is more similar to normal speech than is nonparanoid schizophrenic speech, as has been suggested by Wahl and Wishner (1972) and Hamlin and Lorr (1971). These results parallel earlier studies by Salzinger, Portnoy and Feldman (1966) and Silverman (1972, 1973) who found normals obtained higher cloze scores on normal speech than on schizophrenic speech.

2. That paranoid schizophrenic Ss would be able to decode paranoid schizophrenic and nonparanoid schizophrenic speech better than normal Ss was not supported. Normal Ss were better decoders for all types of speech samples than were paranoid schizophrenics. This suggests that normal Ss have comprehension skills superior to paranoid schizophrenic Ss regardless of speech sample (or language subsystem).

Paranoid schizophrenics were not able to predict paranoid schizophrenic speech significantly better than
normal speech but were able to predict both normal and paranoid schizophrenic speech significantly better than nonparanoid schizophrenic speech. The similarity between normal and paranoid schizophrenic speech is pointed up again inasmuch as paranoid schizophrenics decode the two almost equally well.

3. Nonparanoid schizophrenics did predict normal and paranoid schizophrenic speech significantly more poorly than did normal and paranoid schizophrenic Ss. However, they were not significantly more accurate in predicting nonparanoid speech than were normal or paranoid Ss. In fact, normal Ss predicted (decoded) nonparanoid schizophrenic speech significantly better than nonparanoid schizophrenics were able to. Nonparanoid schizophrenic Ss were more deficient in their decoding ability than either of the other two groups.

That normal Ss did better than schizophrenic Ss in predicting normal and schizophrenic speech samples is in agreement with Honigfeld's (1963) findings. The superiority of normal Ss in decoding nonparanoid schizophrenic speech is more impressive because the speech samples were chosen from acutely disturbed patients. These results do not agree with Moroz and Fosmire (1966) who found no significant difference between schizophrenic and normal raters on schizophrenic speech samples. The difference in Ss may account for this discrepancy. In the present study, schizophrenic raters were in their first month of hospitalization rather than in
their first five years of hospitalization and quite conceivably were more acutely psychotic than those in the Moroz and Fosmire (1966) sample.

Analyzing cloze scores for correct word, it can be said that normal Ss overall had comprehension skills (decoding ability) superior to the two schizophrenic groups regardless of speech samples. Paranoid schizophrenic Ss had greater comprehension skills than nonparanoid schizophrenics for normal and paranoid schizophrenic speech. And nonparanoid schizophrenic Ss were the poorest decoders. These results would tend to discount the idea that there are language subsystems within diagnostic categories and that just being classified in a diagnostic group would signify that one could understand the speech of members of that category better than that of members of another group. However, as will be discussed later, these results do not discount the possibility that there are differences underlying the cognitive functioning of the groups.

The general comprehensibility or encoding ability of the three speaker groups parallels that of the decoding ability of the rater groups. That is, normal speech samples were more comprehensible, followed by paranoid schizophrenic samples, followed by nonparanoid schizophrenic samples when all rater means are pooled. However, degree of comprehensibility did not appear to influence decoding ability of nonparanoid schizophrenics whose performance was flat over all groups. This is not incompatible with Salzinger's
Immediacy Hypotheses. Applying his hypothesis to cloze technique, one would expect that schizophrenic Ss would be associating to the word right before (or after) the blank (the more immediate stimulus) and that the total context of the passage would not be as important in determining their response. Therefore, degree of coherence of the passage would not affect performance. Many of the responses of non-paranoid schizophrenics tend to support this idea. For example, in the phrase "that upward mobile group _____ so happy the majority," one schizophrenic S filled in therapy, an obvious association to group and not to the whole context. Other examples are "you talk about heart _____ the janitor's got one" where one schizophrenic S filled in love, and "the colored people potential Einsteins _____ have to be white" where one schizophrenic S filled in theory. Some paranoid Ss seemed to be doing this also, but the overall impression in looking over their answers was that they were trying to stick to context more closely. The data support this impression in that they got significantly higher scores on the more coherent normal and paranoid schizophrenic speech samples.

It was hypothesized that schizophrenic Ss would be able to predict speech of their own diagnostic group best because they would be attending to the word most proximal to the blank. The results obtained do not discount that this may indeed be happening. It is reasonable to infer that although they may be associating to the most proximal word,
their associations were not identical with those of the speaker, producing a lower cloze score. The process underlying schizophrenic thinking, that is the importance of immediate stimuli controlling attention, may be common to all schizophrenics and yet the content of associations to the stimuli may be idiosyncratic and autistic. This seems to be more characteristic of nonparanoid schizophrenics than of paranoid schizophrenics whose thinking and perception branch out, often to include more than the most immediate stimuli in the environment, in this case, more of the context of the speech passage. Further support for the context effect will be provided under Hypothesis 3.

**Hypothesis 2. Cloze Score II**

1. When cloze score for correct grammatical class is considered, normal Ss did obtain significantly higher cloze scores for normal and paranoid schizophrenic speech than for nonparanoid schizophrenic speech. That there was not a significant difference between normal and paranoid schizophrenic speech lends further support to the notion that normal language structure is more similar to that of paranoid schizophrenics than to that of nonparanoid schizophrenics, and that it is the content of paranoid schizophrenic language that hinders understanding. This point has been supported by Wahl and Wishner (1972) and Hamlin and Lorr (1971). Arieti (1974) and Von Domarus (1944) have also noted the tendency of paranoid schizophrenics to think
within the structure of Aristotelean logic, but to build their arguments on false premises and identity of predicates. Functioning in this manner, the content of paranoid schizophrenic speech may seem bizarre, yet is coherent enough to follow structurally.

2. Paranoid schizophrenic Ss obtained higher cloze II scores for paranoid schizophrenic speech and normal speech than they did for nonparanoid schizophrenic speech. This finding lends further support to the structural similarity between paranoid schizophrenic speech and normal speech. Maher (1972) has postulated that cases of disturbed syntax, where an association of the inappropriate word class intrudes, are indicative of a greater degree of psychopathology than semantic disturbances alone. The above results indicate that the nonparanoid schizophrenic raters and speakers clearly had a greater amount of disturbed syntax and that they can be considered to have a greater disturbance of thought process than the paranoid schizophrenics.

3. Nonparanoid schizophrenics were not able to predict grammatical class of nonparanoid schizophrenic speech better than they did that of normals or paranoid schizophrenics. Again there was little differentiation among speaker groups reflecting the inability of nonparanoid schizophrenics to benefit from greater coherence of text.

It is not clear why the percent increase of cloze score II over cloze score I was almost three times as much for nonparanoid schizophrenics as it was for normal Ss and
almost two times as much for paranoids than normals. It is conceivable that since cloze score I for nonparanoid schizophrenics was so low, that guessing any words for the blanks would tend to increase cloze score II just by chance; whereas, normal Ss with their much higher cloze I scores did not have that much room to improve on cloze score II.

Hypothesis 3

1. Normal Ss guessed significantly more correct words for higher order approximations than they did for lower order approximations indicating that they were able to benefit from increasing context as a clue to the appropriate word. This performance lends support to the notion that the superior cloze scores of normal Ss on normal and then paranoid schizophrenic speech is due to (a) normal Ss' ability to take context into account when completing a cloze analysis and (b) that comprehensibility of the speech samples lies on a continuum from normal to paranoid schizophrenic to nonparanoid schizophrenic.

2. Neither paranoid schizophrenic Ss nor nonparanoid schizophrenic Ss guessed significantly more correct words for the higher order approximations than for the lower order approximations. There was some indication that paranoid schizophrenics were relying on context, however, since over half of their correct responses were on the highest three orders. Nonparanoid schizophrenics, on the other hand, showed no evidence of improvement in performance as context.
clues increased. This would support the hypothesis that these Ss are not using total context as a clue in guessing missing words, but are associating to the word closest to the blank.

Results of this study indicate that there is both an encoding and decoding impairment in schizophrenic communication and that the decoding impairment is just as strong for schizophrenic speech as for normal speech. These data support the immediacy hypothesis (Salzinger, 1973) which postulates that underlying the impaired functioning of schizophrenics is the inability to attend effectively to any but the most immediate stimuli in the environment. Further, there is evidence that paranoid schizophrenic language (and by inference thought process) is more similar in structure to normal language than is nonparanoid schizophrenic language. This is congruent with clinical observations that paranoid schizophrenia is a less regressed or deteriorated form of schizophrenia than, say, catatonic, chronic undifferentiated or hebephrenic schizophrenia.

Implications for diagnosis and treatment of schizophrenia are implicit in these findings. Training of diagnostic skills should include, among other things, careful attention to the structure of the patient's speech as well as to the content. Indications from this study are that the more the structure deviates from normal language, the more likely it is that the individual has a more serious thought
disorder. Experienced clinicians have learned subtle differences in language patterns through practice and "intuition." As more is learned about the language patterns and thought processes from a psycholinguistic point of view, it may be possible to short-cut training in these skills by outlining clearer guideposts to look for.

The cloze procedure is useful in detecting gross differences in speech of different diagnostic categories, however, it does not permit a detailed examination of the ways in which comprehensibility is impaired. More intensive investigation needs to be carried out on the structural differences among normal, paranoid and nonparanoid schizophrenic speech. Is it mainly the content that differentiates paranoid schizophrenic speech from normal or is there also some degree of syntactic disorganization? It may be, as Wahl and Wishner (1972) suggest that the paranoid schizophrenic's tendency to adopt false axioms (content) is itself a reflection of structural disturbance at the prethinking attentional level. Analysis of syntactic units such as that suggested by Pylyshyn (1970) needs to be carried out on paranoid schizophrenic versus nonparanoid schizophrenic and normal language. It is also important to compare speech patterns of schizophrenics at the time of an acute psychotic break to speech patterns when in remission. Can cloze analysis of speech patterns signify an approaching breakdown, improvements from therapy, or differentiate process
versus reactive schizophrenics, or acute versus chronic schizophrenics?

It is possible that a great deal of communication by which schizophrenics understand each other is nonverbal and this is why the expected superior introdiagnostic communication did not show up on cloze analysis. A cloze analysis of schizophrenic and normal speech could be done with videotape so that the important aspects of nonlexical verbal and nonverbal communication could be determined. The attempt to control for intelligence in the present study was by number of years of schooling and occupation. Since verbal intelligence has been shown to be an important factor in performance on cloze analysis (Amarel, Cheek & Stierham, 1966) it is suggested that further studies control more strictly for this variable. However, since many schizophrenics in an acute psychotic episode do not function as well on IQ tests as they do in remission (Foulds & Dixon, 1962) it is suggested that a premorbid or "nonpsychotic" estimate of intelligence be used.

As the clinician becomes more familiar with the language of the patient, he has a better chance of being able to understand and empathize with him. The beginning therapist may be discouraged by what may seem a mass of disconnected thoughts. However, if he has some idea of the process underlying the language output, he will find it much easier to communicate. If, for example, the schizophrenic speaker is responding to the stimuli most immediate in his
environment, one can see how that may make conversation difficult. In order to communicate, the speaker must respond to the beginning of his sentences or even to the topic of conversation initiated, stimuli which may become remote for him. He may be likely to spin off associations to his recent associations making it difficult for the listener to follow him.

Salzinger's Immediacy Hypothesis, Cromwell and Dokecki's Disattention Interpretation, and Cohen's self-editing theory, all with many elements in common, are proving to be successful explanatory systems dealing with language behavior of schizophrenics. Several investigators have been concerned with possible biological factors which may relate to language disorders in schizophrenia. One such notion is that schizophrenics have impaired "autonomic arousal" (Maher, in Miller, 1973, p. 261) stemming from an inefficiently functioning autonomic nervous system. Although the concept of arousal is complex and poorly defined at this point, it would seem that the relation between biological aspects of arousal and attentional deficits in schizophrenia is a fruitful area for investigation which may eventually elucidate the relation between biological aspects of schizophrenia and linguistic symptoms.

Further research into the above theories should be carried out keeping in mind the various subclassifications of schizophrenia. A more specific study of the relation between the intensity of the stimulus and the immediacy of the
stimulus needs to be done. Whether or not the immediate stimuli are external or response-produced in speech is another question that bears further study. The Immediacy Hypothesis has potential value in the treatment of schizophrenia. If one is aware of the stimuli to which the schizophrenic is responding and can establish more effective communication utilizing intense and immediate stimuli, then it is likely that the first step towards establishing a good therapeutic interaction has been taken.
SUMMARY

In order to test Salzinger's Immediacy Hypothesis and the notion that schizophrenics can understand other schizophrenics better than normals can, normal Ss (n=10) and schizophrenic Ss (paranoid n=10; nonparanoid n=10) completed a cloze analysis of normal speech samples (n=10) and schizophrenic speech samples (paranoid n=10; nonparanoid n=10). It was further hypothesized that language structure of paranoid schizophrenic Ss approximates that of normal Ss more closely than does that of nonparanoid schizophrenic Ss.

Results indicate that there is both an encoding and decoding impairment in schizophrenic communication and that the decoding impairment is as strong for schizophrenic speech as for normal speech. Data provided support for the Immediacy Hypothesis, indicating schizophrenic Ss were less able than normal Ss to utilize more remote contextual cues. There was further evidence that paranoid schizophrenic language is more similar in structure to normal language than is nonparanoid schizophrenic language.

It was suggested that further research on the structural differences among normal, paranoid and nonparanoid schizophrenic speech be carried out in order to aid in diagnosis, therapy and treatment evaluation of schizophrenics.
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APPENDIX
INSTRUCTIONS:

This is a study of language. On each of the pages are several samples of the speech of individuals. All punctuation has been removed. You will notice that every so often there is a blank. Every 5th word that was spoken has been left out. Your job is to guess what word you think would make the most sense and write that word in the blank. The missing words are not numbers or names. Do the best you can. It is very important that you fill in all the blanks. Work as quickly as you can. You will probably not be able to finish the booklet at one time so at the end of 1 hour, mark your place and you may finish at the next appointed time.
<table>
<thead>
<tr>
<th>Sentence</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>the history of California</td>
<td>0</td>
</tr>
<tr>
<td>easy if you know</td>
<td>7</td>
</tr>
<tr>
<td>road in the country</td>
<td>5</td>
</tr>
<tr>
<td>saw the football game</td>
<td>4</td>
</tr>
<tr>
<td>tall and thin boy</td>
<td>3</td>
</tr>
<tr>
<td>was he went to</td>
<td>2</td>
</tr>
<tr>
<td>abilities with that beside</td>
<td>1</td>
</tr>
<tr>
<td>byway consequence handsomely financier</td>
<td>0</td>
</tr>
</tbody>
</table>
1.

if i had a 20 ______ workweek i'd get to ______ my kids better my ______ better some kid invited ______ to go on a ______ campus on a saturday ______ was summertime hell if ______ have a choice of ______ my wife and kids ______ a picnic or going ______ a college campus it's ______ to be the picnic if i worked a 20 ______ week i could go ______ both don't you think ______ that extra 20 hours ______ could really expand who's ______ say there are some ______ in factories just by ______ of circumstance i'm just ______ the colored people potential Einsteins ______ have to be white

2.

i might say i've ______ real lucky in farming ______ wife has helped me ______ awful lot she's worked ______ since we've been married ______ girl she likes it ______ loves to get out ______ the tractor our boy ______ worked he liked the ______ and worked from the ______ he was old enough ______ he left he graduated ______ Purdue last spring from ______ him from the time ______ grew up i would ______ he'd make a good ______ he's in Georgia now ______ in management training he ______ he could make more ______ in some other position ______ he can farming i

3.

i usually make it ______ one of those instruments ______ the panel board you ______ there that all the ______ is on and if ______ want to make an ______ i usually make it ______ those instruments and if ______ want to i go ______ to switch a pump ______ something like that i've ______ a very easy job ______ i work an hour ______ sit down and it's ______ no nervous condition because ______ not a nervous type ______ person i don't get ______ in the dark i'm ______ scared of anybody or ______ i'm just not a ______ type of person that

4.

organ inventor that is ______ you something like this ______ you make course i ______ anything can be an ______ is something something that's ______ a curse you see ______ help nature with you ______ microphone dictaphone now i ______ mean i made it ______ myself understand that it ______ admiral king he just ______ on this year he ______ he was with me ______ the dictaphone and a ______
nice person i was ______ a baby boy just ______ young boy
and senior ______ other senior hands and ______ admiral
joy he was ______ machine and i made ______ machine he
passed on

5.
i worked at the ______ i worked at the audubon park ______
off when i was ______ kid as a caddie ______ know used to
caddie ______ at the park and ______ started to work in
______ in the and when ______ left there well i ______
to working at the ______ and after the bank ______ started
to work for ______ pinball operator used to ______ the
finish work on ______ pinball machines but most ______ all
i used to ______ to sing and dance ______ when i was a
______ you know use to ______ and sing a lot ______ was
real good too

6.
in the wintertime sometimes ______ off several months
people ______ say look at the ______ this man's making but
______ other people are working ______ getting nothing in
the ______ mill when they get ______ off they get so
______ money per week for ______ many weeks when i ______
laid off there's nothing ______ than to get another ______
we have no paid ______ no paid vacations we ______ go out
and get ______ own jobs when we ______ laid off we have
______ call the union hall ______ they send you to ______
job whenever it's your ______ you have to just

7.
you talk about heart ______ the janitor's got one ______
the worst he's gotta ______ every day up and ______ stairs
carrying garbage you ______ a hundred two hundred ______
of garbage down going ______ it's bad enough carrying
______ on your back coming ______ with two hundred pounds
______ your back it gets ______ it has never bothered
______ i have a real ______ back by the way ______ been
in the hospital ______ year with a bad ______ shoveling
coil and mopping ______ bad if you have ______ lot of
mopping you' re ______ your hips around i ______ out very
easy because

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in other words be helpful as i could anyone else while i trying to be the guy you might say other day i had a pack of cigarettes i had ordered cigarettes had gotten them and thought that i had said well yes pay cigarettes back so i them to him he thank you and then a while i looked in my pocket and was a pack of i and returned them i guess a lot times i thought i've things and wondered why

so when i had idea i figured the want of for the for the water for which as i say a second form of and in the end objects will be clear they'll still be solid like crystallization is the form of matter see i mean so into this very deeply i sort of wondered the crystal ball and why the gypsies and tribes turned to the ball and it seemed be one of the that made me sick to solve why and

well that operates strictly them i guess the catholics got it between you me well dr not one so the he touched me they me off everything here doctor i can hardly at times i can eat it choking me eat but i eat it doesn't now that's just between you and that's just since that's 2 about 2 months ago he did that cleaning teeth well they cut off of everything and not and not that that's what made weak i don't know

well i was just bad and i just when i got married before i got married do the right thing i got married wasn't working or nothing my father would always my father would always on me and i guilty about it because was laying on him i knew i was enought to go out get a job and on my own it time i did that i just didn't seem do that then i
marrying after i got ______ i would have to _____ do the right thing

12.

it's still there and ______ grown and grows until ______ it gets where it ______ face might come now ______ other face has features ______ it doesn't stay very ______ and then this this ______ i call it comes ______ it it tells you ______ seems like it stays ______ you and it gets ______ sometimes you can even ______ the like you could ______ even have to feel ______ face to be sure ______ it's not your face ______ even went to the ______ to make sure make ______ you don't smell anywhere ______ sometimes you think you ______ smell it it has

13.

then first thing you ______ there's things that start ______ one after another what ______ call putting you on ______ spot with the heat ______ so forth and ______ on that's the best ______ can explain it all ______ time running around used ______ running around on the ______ from one chair to ______ yep and even in ______ even in bed they ______ what they call what ______ say and most of ______ it seems to come ______ vibrations you know will ______ and one thing and ______ and then seems like ______ of it comes up ______ the er bottom of

14.

my stepfather works in ______ mill he used to _____ a pipe inspector he's ______ to be a clerk ______ a better job he's ______ lot more satisfied with ______ than my natural father ______ gets along fine with ______ guys in the mill ______ happy when he comes ______ he knows ex­actly what ______ got to do in ______ he talks very little ______ it he doesn't express ______ but he seems content ______ never said anything against ______ it's a good pay­ing ______ he's looking for retirement ______ a number of years 10 ______ something like that he's ______ going to last out

15.

i don't think they ______ to be doctors or ______ it's not because they ______ know it's that they ______ no expectations some have ______ feelings of wanting to
...teachers they aren't interested professional roles see they want the security of a steady job something parents haven't had in Chicago kids are living out parents' hopes it's popular to look at success minority groups in terms upward mobility I don't that upward mobile groups so happy the majority our parents are on when they screw up get ashamed and hide

16.

I sort of liked girl but she was little young for me I sort of put foot in it and tried to get out it the best way I didn't know that well I still but possible that she a relative of one the vice-presidents and decided there was so friction and jealousy going as far as seniority concerned and some advanced while others come in in positions have moved right up

17.

did I tell you I was a farm maybe I didn't really you about my education as far as actual I had it was 8 - 8 terms that through the that god applied to I made that in 7 but a normal child it in 8 so feel that he was starting to work with at that time I realize how great it but I'm enlightened in many ways I feel now as far as mother was concerned whenever situation come up it one teacher in an

18.

when I was a I was scared of in the fire department gotta go up a five building with a rope you gotta jump a building you know rope can hold sixteen hundred as long as you confidence in your body you know the guy's you got nothing be scared of I perform with people at you're in limelight you're out there the people and kids wave at you when was a kid we at firemen it's like place in the sun
19.

i come home i ______ to go in the ______ door because
i've got ______ greasy boots if it ______ happen to be
about six thirty ______ i won't get cleaned ______ before
i eat i'll ______ down and eat with ______ wife and kids
if ______ already eaten i'll take ______ shower and i'll
get ______ up and i'll come ______ and eat if it's ______
nice night i might ______ out and putz around ______ yard
if it's not ______ outside i'll just sit ______ watch the
tv i ______ really read that much ______ probably read as
much ______ the average american does

20.

well for instance anything ______ wanted to do i'd ______
a kick out of ______ you know in other ______ if i walked
up ______ the fence and looked ______ the fence there'd
be ______ cat that i couldn't ______ or something like
that ______ my grandmother lived right ______ door and my
grandfather ______ they had a big ______ for tourist and
they ______ a ruin house and ______ daddy finally built a
______ and he was a ______ and all that course ______
guess that was before ______ time you know what ______
mean that was all ______ up because when i

21.

that's the royal ambassadors ______ it's a group of ______
that are led by ______ couple of fellows that ______ sup-
posed to be of ______ high standing character it's ______
place to take the ______ out and lead them ______ the
christian path at ______ time i was seriously ______ in it
and did ______ best and had a ______ of compliments on my
______ i was ______ and it began july ______ 4th
a friend of ______ mr x worked in ______ shop with me i
______ do anything in the ______ for him and he ______
for me he was

22.

the coincidence the first ______ lies in the number ______
the flight it's conceivable ______ me that a person ______
had communist leanings might ______ out a certain train
______ a certain airplane and ______ it crash i read
______ article a little bit ______ and in a little ______
more detail this boy ______ arrested i don't really ______
if he has made ______ confession but there were ______
individuals who had given ______ to the fbi and ______ was
the information on ______ they proceeded to make ______ arrest now he had ______ lot of insurance on ______ mother which was considered

23.

the majority of the ______ in the station where ______ worked were young whites ______ older white officers were ______ to get off the ______ trying for a soft ______ in a station somewhere ______ were tired it's the ______ white officer who's in ______ of the black areas ______ want to go there ______ gives them the opportunity ______ be where the action ______ they don't want to ______ to white dis­ tricts because ______ considered slow a large ______ of young white officers ______ gung ho it's an ______ to make a lot ______ arrests make money and ______ a lot of other

24.

a person who's driving ______ cab a number of ______ tends to become hardened ______ hate having to turn ______ down on the other ______ i think of the ______ i may have 60 70 ______ on me at the ______ of a good day ______ money itself is expendable ______ my life isn't i ______ of inci­ dents in which ______ have been shot even ______ surrender­ ing their money this ______ sometimes happen in the ______ of junkies i think ______ guys how hold up ______ are junkies they can't ______ themselves it's not that ______ malicious people it's just ______ they've got this habit

25.

i have to keep ______ of mind is precisely ______ i'm trying to say ______ got to keep out ______ my mind i don't ______ what my mind is ______ that's what i'm trying ______ say i don't know ______ it is anymore where ______ is i mean if ______ should try to realize ______ moment you see i ______ like i'd lose my ______ i wouldn't know where ______ wouldn't know where i ______ mean i wouldn't know ______ wouldn't i mean i ______ i know when i ______ in charity hospital i ______ i reached that point ______ everything was complete careless

26.

well i want over ______ and after i start ______ a while i send ______ my wife but she ______ very well stand the ______ i guess i guess ______ not much use to ______ now
i imagine that's what she told she's not use to see she wanted to back right away i her i said wait i say wait until you know get on feet and when i on my feet and we get on our you see we can back in the meantime have something to live

27.

well you go back the first off i become interested in the masons i got to studying and then i spotted was the one that controlling what they call the superior class of and then i can't the day right now asked a neighbor about prior to then i got an uncle of by marriage to get this thing i didn't about it i well at that time i busy i thought i to work every day my life i said won't have time to

28.

it's better put it this i'm not a when it comes to i mean i'm small since she's been operated my wife doesn't have more reproductive organs but doesn't make any difference mean it didn't make difference then and us told me plenty since she's been wanting to me that for years i can get along my husband so you have me every night you tell me a who can go every not me for sure anyhow who got operated i thing that thing

29.

i'd find out that relax temporarily but i still tense and i to dr x in beginning and when i to well when i riding the truck in job i was tense next to the truck and i was wondering the truck driver would me being tense and just become tireder and and tireder and tireder until i felt i couldn't go anymore i guess it was on me in my and the tenseness in mean they even thought
they had places you ______ if you didn't speak ______ language you'd go to ______ place something like that ______ know what i mean ______ be speaking a language ______ to the place to ______ them know that you ______ know the subject but ______ i mean is to ______ exactly what it was ______ was being able to ______ it too and then ______ hard to include yourself ______ something like that you ______ they don't just include ______ because it's easy to ______ in trouble you know ______ public they always figured ______ they couldn't get money ______ the government they'd get
VITA

The author was born May 17, 1944, in Greenville, South Carolina. She received her Bachelor of Science degree from Louisiana State University in August 1967. Following a year of graduate study at the University of California, Berkeley, she returned to Louisiana State University to complete her Master of Arts degree in May 1971. She was an instructor at Hawaii Community College in Hilo, Hawaii, for one year. She is currently completing her internship at Napa State Hospital in Imola, California, and is a candidate for Doctor of Philosophy in clinical psychology at Summer commencement 1976.
EXAMINATION AND THESIS REPORT

Candidate: Patricia F. Wilcox

Major Field: Psychology

Title of Thesis: A Psycholinguistic Analysis of Schizophrenic Language

Approved:

[Signatures]

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination:

April 9, 1976

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