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THE DISCRIMINATORY POWER OF THE LOYOLA  
LANGUAGE STUDY IN SCHIZOPHRENIA

by

Anthony James Del Vecchio

A Dissertation Submitted to the Faculty of the Graduate School  
of Loyola University in Partial Fulfillment of  
the Requirements for the Degree of  
Doctor of Philosophy

June

1957

## LIFE

Anthony James Del Vecchio was born in Kokomo, Indiana on November 27, 1921.

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## CHAPTER I

### PURPOSE

Since Galton (4) in 1879 first described the process of free association and suggested its use for "uncovering the uncharted depths of the mind" in various modifications, it has become one of the most prominent tools for the study of personality and personality disorders. However, as Galton (4) also later pointed out, "The furniture of man's mind chiefly consists of his recollections and the bonds that unite them. As all this is the fruit of experience, it must differ greatly in different minds according to their individual differences."

Various early modifications of the free association technique have evolved since Galton's original experiments. These modifications have been concerned primarily with interpretation of test results rather than method of testing. Essentially, the "free" association technique had been maintained in all of the early modifications. In interpreting results of the test, three methods have been more fruitful than all other modifications. The first method, initiated by Wundt (5) at Leipzig, attempted to classify verbal responses according to their logical relation to a given list of stimulus words. Jung (32) is credited with having initiated the second modification of adapting discrete associations to stimulus words for psychopathological experimentation. From such indicators as blocking, blushing, repetition of the stimulus words, and



disturbances of breathing, a "complex" as a system of emotionally-toned ideas is inferred. Kent and Rosanoff (33) established a third modification by deriving a standard response list from tabulating responses into frequency tables. This standard list enabled a classification of the associations, and also presented a measure of communality of each response.

To date, the results with the free association methods have not proved as universally successful as first appeared theoretically possible. The efficacy with which the technique is utilized usually depends upon the individual's particular diagnostic ability, often the result of many years of testing and clinical experience. Consequently, experimentation with the free association technique has sometimes resulted in inconsistent, if not contradictory, conclusions. A second possible reason for the lack of reasonable success with the free association method involves a possible erroneous hypothesis of its function. The free association method may not be completely suitable to "uncover the uncharted depths of the mind."

More recent experiments with the free association method have modified the technique in a manner diametrically opposed to the early procedures. They have modified the "free" aspect of the association method by applying controls to the associations. Thus, the technique is changed from its original unstructured "projective" approach to one of relatively rigid limits. In the controlled association approaches, the possible associations are usually limited to any one stimulus word. The responses are chosen according to various criteria, depending upon the goals sought.

In the controlled association experiments the results have not been more gratifying than the original free association method. They have not, for

the most part, fulfilled the tasks for which they were designed; i.e., screening, selecting neurotics, psychotics, or leaders, and diagnosis. However, most experimenters agree that refinements are possible and that the technique should not be discarded.

This study proposes to employ a technique which does not completely utilize the unstructured, projective approach of the free association method, nor its opposite, the more rigidly controlled association technique. The Loyola Language Study is a semi-controlled technique which uses certain qualities of both methods. The "projective" quality is retained because of its demand for recall of past experiences, deliberations, choices, and other factors of ego control. The "control" quality of the controlled association is maintained in the demands of the Loyola Language Study whereby certain "limits" are imposed upon the testee. It would seem, therefore, that the Loyola Language Study reduces the frame of reference to incorporate into its technique those factors most likely to make it an easily administered, easily scored, effective diagnostic test. Its effectiveness should lie in its ability to tap communality of thought, but more important, it measures the individual's awareness of that communal element. Assuming that the presence of disease is directly related to the person's ability to recognize the deviation of his own thought from the thought of the majority of people, the Loyola Language Study presents a technique for objectively measuring and scoring such deviations. The problem in this study, then, becomes one of determining whether or not the Loyola Language Study's measurement of such deviations is sufficiently discriminating to permit its use as a psychological diagnostic instrument.

In order to test the discriminative ability of the Loyola Language Study in schizophrenia, this study has used a schizophrenic and normal population matched as to sex, age, and education for comparison. A schizophrenic population was chosen as the experimental group for several important reasons. First, the mental hospital populations are predominantly populated by individuals diagnosed as schizophrenics. Second, in spite of one hundred years of study, schizophrenia is still not a completely understood disease entity. It is usually categorized in descriptive terms and has no objective criteria to evaluate degree of involvement. The Loyola Language Study offers a possibility for objective measurement of responses by a schizophrenic patient, thereby objectifying the present subjective, descriptive evaluations. Third, a schizophrenic population was utilized because of the wide application of the Loyola Language Study should it discriminate effectively. Its ease of administration and scoring lends the Loyola Language Study to group testing for screening. Thus, incipient schizophrenics would benefit from early diagnosis and the more favorable prognosis for effective treatment.

Essentially, the Loyola Language Study is a technique synthesizing the favorable aspects of two other methods of testing to study a psychopathological condition in the hope of determining an objective method for determining the existence of the disease within an individual. This research tests the hypothesis that the presence of disease is related to the person's ability to recognize deviations of his own thoughts from the thoughts of the majority of people. These deviations are measurable. The problem becomes one of determining whether or not the Loyola Language Study in measuring such deviations is able to discriminate between normal and schizophrenic individuals.

## CHAPTER II

### REVIEW OF LITERATURE

This chapter is designed to review the literature pertinent to the word association technique and to schizophrenia. The present research involves a technique which is similar to both the free and controlled word association techniques, but includes a difference which is felt will render this method more effective in its discriminatory ability. Likewise, the subjects involved in this study are the same in many respects, but are significantly different in their ability to adjust to society.

The word association technique will be reviewed in terms of its historical development and its various modifications through the years. Included therein will be the theories involved, the test's various uses, and its present status as a psychological test. From such a presentation, the reader will be apprised of the similarity and difference of the various association techniques to the Loyola Language Study.

The review of literature of the disease of schizophrenia will be presented in terms of the historical development of the theories of the disease, both from a functional and etiological standpoint, as well as the current concept of the disease. This project, therefore, proposes to study the similarity and/or difference between the normal person and the schizophrenic in their associative process as determined by the Loyola Language Study, a semi-controlled word association technique.

Emil Kraepelin (10) was the first individual to differentiate a disease entity which he called "dementia praecox" from other psychopathological conditions. After examining and observing thousands of patients, Kraepelin could differentiate and define as dementia praecox a symptomatology consisting of hallucinations, delusions, incongruous emotivity, impairment of attention, negativism, stereotyped behavior, and progressive dilapidation in the presence of relatively intact sensorium. Kraepelin divided the patients into three groups: the hebephrenic, the catatonic, and the paranoid. Later he accepted a fourth type, the simple, as suggested by Bleuler. As to etiology, Kraepelin considered dementia praecox an endogenous illness. He first thought it was due to organic pathology of the brain; later he felt that it might be due to a metabolic disorder.

The great contribution of Kraepelin to the understanding of schizophrenia, in addition to his initial delineation of the disease itself, is his remarkably complete, extensive, and accurate description of the disease symptoms. In retrospect, the criticism of his work includes a lack of depth and the appearance that the patient is a collection of symptoms, not a person.

It remained for Bleuler (3) in his monograph to first present the "depth" aspect of dementia praecox. He renamed the syndrome "schizophrenia," implying that a splitting of the various psychic functions, rather than a progression toward a demented state, was its outstanding characteristic. He presented his findings on the fundamental symptoms of schizophrenia as consisting of disturbances of association and affectivity, the predilection for fantasy as against reality, and the inclination to divorce oneself from reality. As Bleuler states (3):

In this malady the associations lose their continuity. Of the thousands of associative threads which guide our thinking, this disease seems to interrupt quite haphazardly, sometimes such single threads, sometimes a whole group, and sometimes even large segments of them. In this way, thinking becomes illogical and often bizarre. Furthermore, the associations tend to proceed along new lines, of which so far the following are known to us: two ideas, fortuitously encountered, are combined into one thought, the logical form being determined by incidental circumstances. Clang associations receive unusual significance, as do indirect associations. Two or more ideas are condensed into a single one. The tendency to stereotype produces the inclination to cling to one idea to which the patient then returns again and again. Generally, there is a marked dearth of ideas to the point of monoidism. Frequently some idea will dominate the train of thought in the form of blocking, "naming," or echopraxia. In the various types of schizophrenia, distractibility does not seem to be disturbed in a uniform manner. A high degree of associational disturbance usually results in states of confusion.

As to the time element in associations, we know of two disturbances peculiar to schizophrenia -- pressure of thoughts, that is, pathologically increased flow of ideas, and the particularly characteristic "blocking."

All the indicated disturbances may range from a maximum which corresponds to complete confusion, to a minimum which may be hardly noticeable.

Although Bleuler's monograph on schizophrenia was and is considered a classic text on the subject and is referred to as a fundamental contribution to psychiatry, changing concepts of the disease entity have been the rule rather than the exception. Meyer (11) was dissatisfied with the role given to heredity and autointoxication in the etiology and pathogenesis of dementia praecox. He felt that perhaps the psychological factors, to which laymen and old schools of psychiatry had given so much importance in the past, should be reconsidered. He advocated that the patient be studied "longitudinally;" from the beginning of his life, all the factors which might have contributed to his mental condition should be searched and examined. Meyer became convinced that dementia praecox was the result of an accumulation of habit-disorders or faulty habits of reaction. The individual who is not able to cope with the problems and

difficulties of life, and who is confronted with failure after failure, may tend toward substitute reactions. At first, these new habits appear as harmless subterfuges, such as daydreaming, rumination, and decrease of interests, but later they become harmful and tend to assume definite mechanisms, such as hallucinations, delusions, or blocking. These mechanisms, according to Meyer, are partially intelligible as substitutions for "efficient adjustment to concrete and actual difficulties." He saw dementia praecox as the outcome of conflicts of instincts or conflicts of complexes of experience and an incapacity for a harmless constructive adjustment.

Jung (8) was the first of the analytic school to make contributions to the literature on schizophrenia. Word association tests convinced him that the dissociated ideas of the schizophrenic were emotionally charged and that the mechanisms which isolated them were the same as those described by Freud in hysterical patients. Jung felt that delusions, hallucinations, and other schizophrenic symptoms were due to the activity of the "autonomous complex," which could not be under the control or correction of consciousness. He thought also that possibly the emotional disturbance in dementia praecox engenders an anomalous metabolism which injures the brain so that the highest psychic functions become paralyzed.

In 1913 Jung differentiated his psychological types (7). He felt that whereas in hysteria one always finds an emotivity and psychic energy directed centrifugally, in dementia praecox the psychic energy is centripetal.

Whereas Jung was inclined to minimize greatly the role played by environmental or interpersonal forces in schizophrenia, Harry Stack Sullivan felt more concerned with what goes on between people than with the intrapsychic.

In his study of schizophrenia, Sullivan (53) states that, "The disorder is one in which the total experience of the individual is recognized." He criticizes Bleuler's formulation of the disorder as based on impairment of the association of ideas, and reaches the conclusion that the primary disorder is one of mental structure. He felt that the mental structure is dissociated in such a way that "the disintegrated portions regress in function to earlier levels of mental ontology." Thus, Sullivan attempts to explain the schizophrenic symptomatology as a return to infantile and fetal mental functions exclusively.

Arieti (1) has recently presented a general interpretation of the schizophrenic process which most aptly conveys the current theories of the disease process. With respect to psychogenic factors, which usually lead to a schizophrenic disorder, Arieti contends that an extreme state of anxiety, originated in early childhood, produces a vulnerability which lasts for the whole life of the individual. The person then desperately attempts to maintain contact with reality, and under certain conditions of stress, his defenses become increasingly inadequate. Confronted with overpowering anxiety, he finally succumbs, and the break with reality occurs. Thus, if he cannot change himself any longer, not even in a neurotic way, he has to change reality. However, as Arieti states, "But reality cannot change, and he has to change himself again in order to see 'reality' in a different way." The patient then resorts to mechanisms at his disposal to envision reality in a less frightening manner. Of particular importance is the adoption of a special type of thinking called paleologic, the processes of desymbolization and desocialization, and the retreat from emotions.

The basic psychological process of schizophrenia, according to Arieti,



consists of impairment, in various degrees, of the ability to abstract. All the manifestations are seen as a consequence of this impairment. In the process of abstraction, a part or a quality is separated from the whole. In paleologic thinking this separation is not possible. The inability to abstract prevents the use of common symbols, which are nothing more than abstractions. The absence of abstractions thus prevents socialization and the experience of all those emotions which are connected with belonging to an integrated society.

From Arieti's longitudinal viewpoint, schizophrenia is divided into four parts. As has been mentioned, an uncoped-with state of anxiety and vulnerability, whose roots are to be found in early childhood, makes the patient enter the first stage of the illness. In this stage he exploits a potentiality for using archaic mechanisms which are dormant in every human being. The patient resorts to them when any other method of decreasing anxiety and maintaining his own individuality has failed. In this stage the patient is still struggling between the world of reality and the world of his symptoms.

The second stage, according to Arieti, finds a cessation of hostility between reality and illness, with no apparent emotional turmoil. Paleologic thinking and desocialization are present with the patient's apparent acceptance of his illness. However, the patient does not integrate at this lower level. It is no more possible for the patient to integrate at a lower level than it is possible for a cortical animal to operate as a healthy noncortical species. Similarly, no matter how much the schizophrenic regresses, he cannot become a healthy infant, and will always be disintegrated.

Arieti feels that the third state of regression is reached when the patient's voluntary life is so much obliterated that certain primitive habits

require prominence. The particular habit which epitomizes this state is the one of hoarding. This leads to the fourth state as the patient attempts to make the hoarded objects a part of himself, usually by ingestion. At this terminal stage of the illness many patients also show quasi-neurological alterations. These alterations indicate a regression to a level where many of the common perceptions do not exist.

From his study of the process of schizophrenia from a longitudinal as well as a dynamic viewpoint, Arieti defines schizophrenia as, "A specific reaction to an extreme state of anxiety, originating in childhood, and reactivated later in life by psychological factors. The specific reaction consists of the adoption of archaic mental mechanisms, which belong to lower levels of integration. Inasmuch as the result is a regression to, but not an integration at lower levels, a disequilibrium is engendered which causes further regression, at times to levels even lower than the one in which certain perceptions are possible."

The word association technique, as first described by Galton (4) in 1879, preceded Kraepelin's description of dementia praecox in 1895 by nearly two decades, although Wundt's laboratory work on free association techniques paralleled, in time, the work of Kraepelin. As has been previously indicated, Bleuler contended that the schizophrenic manifested the phenomenon of a "loose association." Similarly, Jung felt that schizophrenics were imperfectly adapted to reality and thus would "imperfectly" utilize reality word symbols. Therefore, it appeared only natural that the word association technique be utilized for the purpose of better understanding of the disease process of schizophrenia.

In spite of its apparent ideal suitability for the investigation of

aberrant associative processes, the word association technique has not proved as successful as was first expected. In 1948, after almost seven decades of numerous experimentations by various workers since Galton's original publication, Bell (2) succinctly summarized the status of the word association technique by stating, "The simple procedure of presenting a list of words to a subject and asking for the first word that comes to mind is well known....and, in its present state of development, is of limited clinical usefulness."

With respect to methodology, the free association technique was used exclusively prior to the fourth decade of the twentieth century. The attempted modifications dealt primarily with the analysis of the free association responses. Of all the modifications attempted, three proved to be more useful than all the others.

The first modification dealt with classifying associations according to logical relationships between stimulus and response. Wundt (5) initiated this method at Leipzig during the last two decades of the nineteenth century in his psychological laboratory while engaged in a bitter dispute with the Wurzburg School over the psychology of thinking. Murphy (46) adopted this method in 1923 to study the types of association in schizophrenics, manic-depressives, and normal persons. His study included as subjects 250 normals, 120 schizophrenics, and 82 manic-depressive patients. His analysis of the results by this classification method showed in every case an overlapping of the groups, and in most cases no significant differences in central tendencies. The normal group gave far fewer "coordinates" and far more adjective-noun associations and noun-adjective associations than either of the pathological groups, but the latter groups did not differ significantly from each other. Rhymes and sound associations

appeared to be slightly more characteristic of the manic-depressive group than of the dementia praecox. Responses in the form of proper names and responses using the first personal pronoun did not appear to be particularly characteristic of either disorder. The associations of both pathological groups resemble the associations of normal adults very much more than they resemble the associations of children, whether measured by the Kent-Rosanoff "frequency method," or by computing the number of associations following within various types.

Probably the most important confirmation to come from Murphy's study is that it seems to decidedly confirm the conclusion of Kent and Rosanoff that, "A large collection of material shows a gradual and not an abrupt transition from the normal state to pathological states." The conclusion of Kraepelin that the associations of his patients deviate remarkably little from those of the healthy seems also to be confirmed by Murphy's study.

Although Murphy was disappointed with his results, he states, "The present data justify no conclusion as to the possibilities of the association experiment in the field of detailed analysis of particular associations, the psychogalvanic method, or the statistical analysis of association-times. The suggestion is offered that types of word association, as such, are but little related to the fundamental attitudes and adaptations to life underlying the mental disorders which are here compared."

The second modification of the word association technique was originated in the clinical laboratory by Jung (32) for investigating emotional disturbances. His method consisted of an individually administered, oral presentation of one hundred stimulus words with an accurate recording of the spontaneous responses and a timing of the reaction to the nearest one-fifth of a second.

A second reading of the list of words to the subject was made with a request to recall the original responses. Jung felt that by such a technique, emotional complexes within the individual would be tapped by noting any irregularity of responses. Jung claimed that any irregularity of response indicated an emotional complex. He distinguished three major types of such irregularity: abnormality of content in the response words, unusually long or short reaction time, and test behavior of the subject himself. The presence of several "complex indicators" indicated to Jung that some emotion was disturbing the subject.

In a lecture delivered at Clark University, Jung stated (7):

In order to understand the matter comprehensively we must bear in mind that the association experiments cannot deal with a separated psychic function, for any psychic occurrence is never a thing in itself, but is always the resultant of the entire psychological past. The association experiment, too, is not merely a method for the reproduction of separated word couplets, but it is a kind of pastime, a conversation between experimenter and test person. In a certain sense it is even still more than that. Words are really something like condensed actions, situations, and things. When I present a word to the test person which denotes an action, it is the same as if I should present to him the action itself, and ask him, "How do you behave toward it? What do you think of it? What do you do in this situation?"

A third modification of the word association technique was initiated by Kent and Rosanoff (33) in their study of association in insanity. They state that, "The one tendency which appears to be almost universal among normal persons is the tendency to give in response to any stimulus word one or another of a small group of common reactions."

As previously mentioned, earlier modifications emphasized a logical relationship between stimulus and response words, as well as reaction time and the subject's behavior. Kent and Rosanoff attempted to measure mental disturbance by unusual content responses. Thus, abnormality became directly measurable in direct proportion to the number of unusual or idiosyncratic responses.

In order to test their hypothesis, Kent and Rosanoff constructed a list of one hundred words, theoretically more neutral than Jung's word list, and administered them to 1,000 normal subjects, 108 schizophrenics, and 139 other psychotics with a nonschizophrenic diagnosis. Using the responses of the one thousand normal subjects as a standard, alphabetically listed frequency tables of all responses to every stimulus word were derived. With the use of these tables, subsequently administered tests could be scored, with the resultant score interpreted as an estimation of communality of thought.

In classifying adult responses, Kent and Rosanoff placed them into three broad categories: Common Reactions, Doubtful Reactions, and Individual Reactions. Table I below presents the results of their study with the 1,000 normals and 247 insane persons:

TABLE I  
RESPONSES OF NORMAL AND INSANE ADULTS TO THE  
KENT-ROSANOFF FREE ASSOCIATION TEST

| Subjects            | Common<br>Reactions<br>% | Doubtful<br>Reactions<br>% | Individual<br>Reactions<br>% |
|---------------------|--------------------------|----------------------------|------------------------------|
| 1,000 normal adults | 91.7                     | 1.5                        | 6.8                          |
| 247 insane adults   | 70.7                     | 2.5                        | 26.8                         |

Whereas the normal population had 91.7% common reactions, the insane population had only 70.7% common reactions. The individual reactions varied from 26.8% for the insane population to 6.8% for the normal population. In the dementia praecox psychosis, Kent and Rosanoff found the average number of individual re-

actions far exceeding not only that of the normal group but also that of any other psychosis studied by them. To a corresponding extent, they found the average number of the highest type of normal reactions reduced. Although almost every type of individual reaction by the dementia praecox showed an increase over the normal average, the most striking increases were in the groups of unclassified reactions, neologisms, sound reactions, and some types of perseveration. Upon examining the individual test records of the dementia praecox population, Kent and Rosanoff found no uniform associational tendencies, but several tendencies appeared with more or less greater frequencies either alone or in various combinations. Some of these tendencies, when appearing at all prominently, were so highly characteristic of dementia praecox as to be almost pathognomic. These associational tendencies were: (1) the tendency to give neologisms, particularly those of the senseless type; (2) the tendency to give unclassified reactions largely of the incoherent type; (3) the tendency toward stereotypy manifested chiefly by abnormally frequent repetitions of the same reaction.

Kent and Rosanoff also noted that not infrequently cases of dementia praecox gave test records that could not be distinguished from normal. They stated, "It seems that the pathological associational tendencies constitute merely a special group of symptoms, some of which may be expected to be manifest in cases which have reached a state of advanced mental deterioration, but may not necessarily be present in the early stages of the disease." On the other hand, Kent and Rosanoff felt that these tendencies may in some cases appear among the earliest manifestations. They concluded that the test records of dementia praecox depart from the normal not sharply but by a gradual shading

off.

Thus, the three modifications of analyzing the "free" response to the presentation of a stimulus word provided the broad foundation upon which subsequent free association research has been predicated. In some studies, as will be shown later, the original modifications were repeated in an effort either to confirm the original studies or else to confirm other hypotheses. The greatest number, however, used various combinations of modifications to refine the free word association technique for more reliable and valid results in studying disturbances in association.

Probably as a result of Murphy's own disappointment over the findings in his method of classifying responses, little was done to follow up his idea in the study of psychopathological processes. In 1945 Martin (41) made a partial repetition of Murphy's study. Data were obtained from a study of one hundred pathological cases, all of which were inmates of the State Hospital at Terrell, Texas. The word list containing 75 words from the Kent-Rosanoff list and 25 verb stimuli of Murphy's own choosing was administered to 63 schizophrenics and 37 manic-depressives. Martin found no startling, outstanding, or reliably significant differences in central tendencies except in responses of adjective-noun associations. In these associations there seemed to be a strong tendency on the part of the manic-depressives to "link" nouns to adjectives. Manic-depressives also tended to give responses of more than one word which violated the directions given to the subjects, viz., to respond with only one word. The schizophrenics, on the other hand, tended to repeat the stimulus word and also to change the word form of the stimulus word. Neologisms and stereotypy were not characteristic of either group. Martin felt that her study



further confirmed the conclusions of Kent and Rosanoff that there is a gradual and not an abrupt transition from the normal to the pathological state. Martin indicated two factors which were likely to influence the whole procedure, namely, the personality of the investigator and geographical differences. Martin's study of the classification of responses according to a logical relationship between stimulus and response is the most recent one to appear in the literature.

Kohs (35) in 1914 reported on the association method and its relation to the complex and complex indicators. Since he felt that, "The process of association is, from the synthetic point of view, the keystone of our mental life," Kohs reviewed and synthesized the previously published literature on the free word association technique, and then proceeded to define terms in the hope of refining the technique.

Besides frequency, vividness, recency, primacy, intensity, and emotional congruity, Kohs felt that there were a large number of factors which tended to influence the relations between ideas. Attempts to arbitrarily classify these connections into different categories, inner, outer, egocentric, and various combinations thereof, have failed in many respects. These failures have largely been due to one or more of these reasons: (1) The classifications were artificial; (2) There was a tendency to be superficial; (3) The classifications were not based on introspection, and as a result they were objective instead of being subjective; (4) The separate categories were not sufficiently exclusive; (5) The experimenter may not correctly interpret the response; (6) The presence of mental imagery aroused by the stimulus was but poorly expressed by a single word response.

According to Kohs, the literature was very vague in the use of the words "constellation" and "complex." "Constellation" was considered an associative grouping of various ideas around a central idea. This definition was modified by Kohs to include, "The experience creating a constellation of ideas must have been individual, subjective, have occurred within recent time, and must possess a distinct feeling tone." The "complex" was considered a constellation possessing a more intense affective-toning. The constellation became a complex when the affective content changed from feeling to emotion. However, complexes were neither pathognomic nor pathogenic, and the phenomenon was perfectly normal. According to Kohs, the handling of the complex by the individual determined its degree of normality.

Kohs found that most workers agreed that the following factors influenced associative relations:

(1) Age - Children responded with particular ideas, whereas 80% of adult responses were by means of general ideas.

(2) Sex - A large portion of complexes belonged to the sex sphere. The percentage was greater in women than in men, at approximately a five to one ratio.

(3) Family - Relatives showed a marked agreement in reaction type. Children tended to resemble the reaction type of the mother more than that of the father.

(4) Intelligence - Subjects coming from a lower level of intelligence were not accustomed to think in terms of single words or ideas, but in sentences. Feeble-minded and epileptics showed a striking poverty of ideas and tended to give stereotyped responses.

(5) Occupation - Many complexes were related to the subject's occupation and habits.

(6) Emotion - Anger, overwork, insufficient sleep, and exhaustion tended to increase the number of associations by assonance and rhymes. Emotions greatly influenced reaction time -- feelings of pleasure facilitated associations; feelings of pain inhibited them.

(7) Beliefs and Ideals - These were usually repeated in reply to stimulus words.

(8) Drugs - Drugs increased the number of associations by assonance and rhymes.

(9) Practice - Practice tended to decrease reaction time.

Kohs classified the complex indicators into three types: qualitative, quantitative, and physiological. Table II presents the three lists.

Kohs drew his conclusions from the pedagogical as well as the psychological viewpoint. Pedagogically, he states:

1. Every one of us possesses a different mass of associated complexes.
2. Education fixes certain associations between ideas. These associations are not easily broken down.
3. The greater amount of objective experiences obtained by the child, the better equipped will he be later, for nearly 50% of our oft-repeated associations date back to childhood and youth.
4. The emotions greatly affect the facility of associations. Pleasant emotions help, unpleasant ones retard, the process. Therefore, the aim in education should be for pleasurable feelings all the time in order to facilitate the acquisition of knowledge.
5. The association complexes of the family have an enormous directing effect upon the formation of complexes in the children.
6. Children's questions ought to be given more earnest consideration.

TABLE II

## KOH'S' WORD LIST OF COMPLEX INDICATORS IN THE FREE ASSOCIATION TECHNIQUE

| I<br>Qualitative   | II<br>Quantitative  | III<br>Physiological<br>Complex Indicators  |
|--|---|---|
| <ol style="list-style-type: none"> <li>1. Content</li> <li>2. Whispered response</li> <li>3. Failure to understand</li> <li>4. False reproduction</li> <li>5. False recall</li> <li>6. Perseveration               <ol style="list-style-type: none"> <li>(a) Response</li> <li>(b) Stimulus</li> <li>(c) Affect</li> </ol> </li> <li>7. Inhibition</li> <li>8. Failure to respond</li> <li>9. Quotations</li> <li>10. Titles</li> <li>11. Sentences</li> <li>12. Symbolisms</li> <li>13. General concepts hiding the meaning</li> <li>14. Addition of the article</li> <li>15. Naming of an object in the examiner's room</li> <li>16. Peculiar form of the response</li> <li>17. Unusual response</li> <li>18. Errors in response</li> <li>19. Assimilation</li> <li>20. Vacuum</li> <li>21. Unmeaning responses</li> <li>22. Nonsense</li> <li>23. Incomplete responses</li> <li>24. Supplementations of stimulus words</li> <li>25. Symmetrical responses               <ol style="list-style-type: none"> <li>(a) Stimulus word, usually of double meaning, is not interpreted in its customary sense.</li> </ol> </li> <li>26. Postcritical responses</li> <li>27. "Versprechen"               <ol style="list-style-type: none"> <li>(a) Arranging some stimulus so as to be incorrectly perceived</li> </ol> </li> <li>28. Complex surrogate</li> <li>29. Translations</li> <li>30. Interjections or single letters</li> </ol> | <ol style="list-style-type: none"> <li>1. Time</li> </ol> | <ol style="list-style-type: none"> <li>1. Psychogalvanic reflex</li> <li>2. Electro-motor heart flow</li> <li>3. Pulse</li> <li>4. Respiration</li> <li>5. Blood pressure</li> <li>6. Involuntary movements</li> <li>7. Ataxiagraph (involuntary body sway)</li> <li>8. Knee-jerk</li> <li>9. Lifting ability of the finger (ergograph)</li> <li>10. Tapping test</li> <li>11. Strength of grip</li> <li>12. Facial expressions</li> <li>13. Tone of voice in response</li> <li>14. Ability to concentrate</li> <li>15. General conduct and behavior</li> </ol> |

Our treating their every inquiry as a matter of mirth is absolutely unjust. Truth and seriousness ought to prevail instead.

From the psychological standpoint, Kohs concluded that the research into the area of "complexes" had not advanced very far beyond the classification of the temperaments. He does feel, however, that the trains of association are very significant for information regarding the condition of mentality, range of information in any particular subject, and logical sequence of the thought processes. In closing, Kohs states, "I cannot but emphasize the importance of the complex and the constellation as factors shaping our destinies, and the importance of the association method in determining what these complexes and constellations are."

Kohs' work marked the first of many criticisms of Jung's work on complex signs. These criticisms have varied from the relatively mild criticism of Kohs' report to the categorical statement by Hull and Lugoff (3) that, "Of the one hundred word Jung list, not a single word showed its quota of complex sign indicators."

Eysenck (27) contended that abnormal preference judgments in certain circumstances were better complex indicators than the three types of irregularities mentioned by Jung. For any particular research, Eysenck suggested that the investigator should prepare a list of about 15 to 20 words. This list should contain six to eight words which might reasonably be expected to arouse some emotional reaction connected with the purpose of the inquiry. Care should be taken not to include too many words either with pleasant sound and unpleasant meaning, or with unpleasant sound and pleasant meaning, as the bipolar factor may cause difficulties.

Eysenck found that the average ranking of the group can be used as the standard with which the individual rankings are compared. His various experiments indicated that even with comparatively few subjects, this average ranking has a high validity. Low correlations of individual rankings with the average would then serve as an index of the subject's "abnormality;" high correlations with the average as an index of his "normality." He concluded that, "Unusual or 'abnormal' preference judgments are often caused by complexes or emotional difficulties which inhibit the normal response. Consequently, it was suggested that such 'abnormal' preference judgments might be used as indicators of the complexes which caused them, and it appeared that words would prove a useful medium."

Effort was made to throw some light on the factors which ordinarily determine our preference judgments for words, and a number of introspections were quoted to show that when a person's judgment runs counter to that of the majority, it is frequently possible to find the causes for such deviations in his unconscious.

The plight of the word association technique is probably best illustrated in comparing the hypothesis of Eysenck (27) in his previously mentioned study, and the hypothesis tested by Tendler (53). Eysenck felt that a short word list, with certain specifications to fulfill the requirements specified, could be derived for each new piece of research. On the other hand, Tendler felt that a selection of 25 stimulus words from the Kent and Rosanoff list, which showed the highest potency for eliciting certain features of associative pathology, would point up significant features of disturbance in free association. He felt that definite gain should follow the supplementing of the theor-

etical and clinical approaches of psychological research in the field of abnormality by an objective, quantitative, and comparative psychological approach. This approach would direct attention to individual differences, to various indices of abnormality, to degrees of severity, and to differential features. This would lessen the difficulties connected with obtaining clear-cut differential diagnoses with which to associate psychological factors. It would also remove the further complication of the variation of emphasis placed upon the complaints by both examiner and patient, together with the complications that arise when examiners apply varying theoretical frames of reference. Finally, Tendler felt that statistical methods offer the possibility of simplifying the complexity of the psychopathological picture by reducing it to measureable specific factors of diagnostic significance.

Table III presents the 25 word list that Tendler derived from the Kent and Rosanoff word list. Included with the 25 stimulus words are their mean range per cent scores. With this list, Tendler attempted to develop a diagnostic free association test for the measurement of disturbances in association. Specific features studied were: tendency to respond by contrasts, by individual responses, by adjectives to noun stimuli, or vice versa, delays in time of response, and failure to recall original responses. Except for contrasts, all of these features were found to be indices of association pathology, positively intercorrelated by sufficiently low to be treated independently. Contrast response is negatively correlated with these features and constitutes an index of normality.

Application of this 25 word list to psychotics, psychoneurotics, and mixed conditions yielded data for analysis as to reliability, differential

TABLE III

## TENDLER'S DIAGNOSTIC WORD LIST IN THE FREE ASSOCIATION TECHNIQUE

| Stimulus Words | Mean Range % Score |
|----------------|--------------------|
| 1. dream       | 45.6               |
| 2. sweet       | 46.3               |
| 3. soft        | 47.1               |
| 4. sleep       | 47.2               |
| 5. dark        | 49.0               |
| 6. quiet       | 50.2               |
| 7. hungry      | 50.2               |
| 8. anger       | 51.0               |
| 9. beautiful   | 51.1               |
| 10. man        | 51.9               |
| 11. loud       | 52.1               |
| 12. long       | 52.3               |
| 13. blue       | 52.5               |
| 14. slow       | 53.4               |
| 15. working    | 53.9               |
| 16. child      | 54.8               |
| 17. heavy      | 55.2               |
| 18. rough      | 59.0               |
| 19. memory     | 60.6               |
| 20. house      | 61.4               |
| 21. trouble    | 61.6               |
| 22. religion   | 62.2               |
| 23. hard       | 67.6               |
| 24. deep       | 69.8               |
| 25. wish       | 70.0               |



significance, and relation to general mental ability. The test showed high reliability for specific features: time and recall correlated in moderate degree with I. Q.; the adjective-noun response was found to be characteristic of psychoneurotics, and individual response of psychotics; adjective-noun and individual response were found to correlate negatively.

Thus, two almost diametrically opposed modifications of the word association technique were utilized in the study of disturbances in association, and each worker felt his technique was successful. Secord (51) sought an objective word association technique even differently than did Tandler, and still constructed his own word list as did Eysenck. However, Secord used homonyms. The purpose of his study was twofold: to devise a method whereby specially constructed word association tests could be scored with maximum objectivity, and to develop a useful measure of bodily concern.

Steps in construction of the homonym word association test included the following: (a) The selection and definition of the variable which the experimenter wished to measure; (b) The compilation of a list of homonyms each of which had one or more meanings pertaining to the variable and one or more not pertaining to the variable; (c) The administration of the list to large groups of subjects with instructions to write down the first word that occurred to them upon oral presentation of each homonym; (d) The application of item analysis procedures to achieve internal consistency; and (e) Tentative validation of the test.

The homonym technique proved highly successful in achieving objectivity in scoring; the correlation between Secord and each of two independent scorers was .99 in both instances. The test was interpreted as a measure of the

degree of body-cathexis characteristic of the individual. Data which lent tentative support to this interpretation consisted primarily of a demonstration of congruence between scores obtained by the test and results obtained from widely different approaches; i.e., the Rorschach test and a body acceptance scale.

In a sense, the previously mentioned works of Eysenck, Tandler, and Secord interested themselves in the word association technique itself, and in modifying the technique, they hoped to achieve their various goals. More recently, the shift of emphasis in the free word association technique has been away from the test and directed toward the subject. More specifically, these recent workers have been studying certain dynamic aspects of personality and the manifestation of these dynamisms through the word association technique. McGinnies' study (38) of personal values as determinants of word associations is an example. To secure indices of value orientation, McGinnies administered the Allport-Vernon Study of Values to 25 male and female students at Radcliffe and Harvard. As symbols of each of the six values measured by the scale, 36 words were chosen by agreement of three judges familiar with the Spranger categories. An interval of several weeks elapsed between administration of the value scale and the experimental procedure.

In order to analyze the data, i.e., the responses, McGinnies devised a sevenfold classification system which seemed to encompass all of the subjects' responses. The categories which were adopted as descriptive of the association responses are as follows:

1. Covaluant responses: responses clearly related to the same value area as the stimulus word. Included were synonyms.
2. Contravaluant responses: the subject responded with a word which

was opposite in meaning or connotation (example: profane - sacred).

3. Evaluative responses: those associations which made an appraisal of the stimulus word. Examples of such a response are "good," "bad," or "nice" applied to any stimulus word.

4. Egocentric responses: a personal or subjective response to the stimulus word, such as "mother" to "loving," or "me" to "dominate."

5. Blocked responses: failure to associate to a particular stimulus word.

6. Repeat responses: repeated stimulus.

7. Miscellaneous: all other responses.

According to the Allport-Vernon Study of Values score, highly valued words gave rise to proportionately more covaluant and evaluative associations. Stimulus words representing areas of low value tended to arouse proportionately more contravaluant and miscellaneous responses. McGinnies concluded that the subject has a general set to respond in terms of his major values; he therefore makes associations which are congruent with his value orientation.

Haigh (29) corroborated McGinnies' work in confirming that personal values are selective factors in perception.

The subject's mood, instead of personal values, was the basis of Bousfield's study (19). He tested two related hypotheses simultaneously: (a) With pleasant mood there is a facilitation of verbal associative responses having pleasant affective value; (b) With unpleasant mood there is a facilitation of verbal associative responses having unpleasant affective value. A total of 994 students served as subjects in the experiment. The subjects rated their moods on a plus five to minus five basis, plus five indicating that one feels as well

as possible, and minus five indicating that one feels as bad as possible. The subjects were also asked to list on paper verbal associates of the following categories: (a) pleasantly toned items; (b) unpleasantly toned items; and (c) neutrally toned items. Each group listed items in but one of these categories. Signals were given at successive two minute intervals at which each subject indicated his progress by drawing a line under the last item he had written.

The data appeared to support both hypotheses, but support for the first was more evident than support for the second. Bousfield explained the difference as being a result of a greater amount of expendable energy with high moods. Therefore, this energy allowed for greater production of all three classes of associates by high moods.

Ericksen (26) investigated individual differences in response to ego-threat, and the effect of these differences upon the perceptual recognition of ego-threatening stimuli. Two sub-experiments were involved. Experiment I was a memory for incompleted tasks. Sixty-one Johns Hopkins students were subjects, and the 14 tasks were designed so that each subject would be successful on half and fail the other half. The subjects were divided into an experimental (ego-involved) group and a control (non ego-involved) group. Experiment II determined the relation between association time and recognition threshold for various words.

Ericksen felt that the main effect of ego involvement on the recall of completed versus incompleted tasks was to increase greatly the group variance. Although the experimental group recalled relatively more completed tasks than did the control group, the most marked difference was their greater variability. The increase in variance with ego involvement reflected marked individual

differences in response to threat.

Individuals who responded to ego-threat in Experiment I with a high success-to-failure recall ratio showed considerably larger correlations between their association time and recognition thresholds for words than did individuals with low success-to-failure ratios. Erickson interpreted this as demonstrating the role of different ego defenses in the perception of ego-threatening stimuli.

Carlson (20) hypothesized that individual differences in the recall of word association test words could be utilized as an independent measure of personality. He felt that memory is affected by the emotional implication of the material to be remembered. Items producing association disturbances in a word association test may be potentially threatening to the individual, since they are thought to relate to anxiety-laden, repressed material. This orientation toward the test led Carlson to the notion that items producing association disturbances may be more difficult to remember than neutral items. To test this hypothesis, Carlson utilized questionnaire material, a word association test, and a recall test for the stimulus words in testing 95 college students as subjects. Selective recall scores were computed to reflect each subject's relative tendency to recall words with shorter reaction times and words without reproduction failures.

These recall scores were somewhat low in reliability, but individual differences tended to be related in a consistent way to the questionnaire variables, hysteria, psychasthenia, cyclothymia, and memory for pleasant versus unpleasant experiences. The multiple correlation between these questionnaire variables and reproduction failures recall was statistically significant with reaction time recall partialled out. The multiple correlation between the

questionnaire variables and reaction time recall was not significant with reproduction failures recall partialled out. Only psychasthenia was significantly predicted from the best combined estimate of reaction time and reproduction failures recall. Carlson concluded from these results that, "Memory for word association test items is not due entirely to the characteristic of the stimulus words but is determined in part by factors in the organization of the individual's personality."

Laffal (36) tested two hypotheses concerning the learning and retention of words with association disturbances. The first hypothesis assumed no difference in the number of trials required to learn words with association disturbances and words without association disturbances to a given criterion. The second hypothesis assumed no difference in the retention of words with association disturbances and words without association disturbances over varying periods of time. Eighty college males were used as subjects, and each was given a one hundred word association test. From the results of this test, ten words with association disturbances, and ten words without association disturbances were selected for each subject, and the words were arranged in a list, each word being paired with a picture. The subject learned to give the word in response to a presentation of the picture. Separate groups of twenty subjects each were called back at intervals of 15 minutes, 2 days, 4 days, and 7 days after learning, and asked to recall as many of the learned words as they could in a free recall period lasting five minutes. Following this, each subject was required to relearn the paired associates.

It was found that disturbing words took significantly more trials to learn than neutral words. The data suggested that there was no difference in

retention of disturbing and neutral words which could be attributed to the disturbance factor.

The repression explanation of disturbances on the word association test was supported by the finding that disturbing words took significantly longer to learn than neutral words. Possible explanations of the failure of clear retention differences for the two types of words to appear were:

(1) The anxiety associated with the disturbing words, which was responsible for the initial difference in learning, was permanently reduced in the learning, and hence did not influence the retention measure.

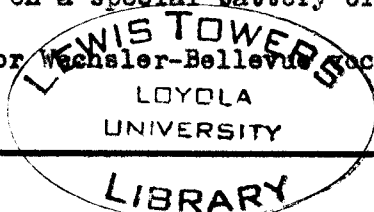
(2) Anxiety was not a major factor in producing competing responses in the original learning of the disturbing words.

Laffal (37) in a later study related reproduction failures in word association as a function of response entropy. Although this fact was tacitly accepted in clinical uses of the test, few researchers have attempted to experimentally confirm its value in diagnostic efforts. Laffal used eighty male college students at the University of Iowa as subjects. He administered the word association test in the usual manner, followed by a retest with a request to repeat the original response. The data suggested to Laffal that response faults were largely a function of the nature of the associational response hierarchy of the stimulus word. Response faults were most likely to occur where there were many competing responses in the response hierarchy, and less likely to occur where there were strongly dominant responses in the hierarchy. Laffal felt that such an analysis did not completely rule out the role of emotional factors in the production of response disturbances. It would seem, however, that emotional factors might be most reasonably adduced to explain response

faults only in words with strongly dominant responses. In such cases the fault might reflect the subject's need to avoid dominant response. Laffal concluded that, "Words which produce many different responses and have high entropy response hierarchies are not good criterion words for ascertaining emotional disturbances."

Little mention has been made as yet of the role of the word association technique in actual clinical application as well as clinical research. In the former, Jung and Freud have made this technique the cornerstone of their respective therapeutic techniques. In regard to clinical research, the application of the word association technique in the study of schizophrenia is preponderant. This would naturally follow from Bleuler's thesis that the primary symptom of schizophrenia is "looseness of association," as well as Jung's thesis that words are symbols of reality, and a maladaptation to reality would predicate a maladaptation in the use of symbols. Later work by Goldstein, Sherer, Bender, et. al., involving the thesis that the schizophrenic could not abstract but instead tended to confabulate, and fragmented his perceptions into discrete parts and various other aberrant perceptual and responsive difficulties, pointed up the favorable possibilities for the use of the word association technique.

Moran (44) conducted an interesting experiment in which he compared vocabulary knowledge and usage among normals and schizophrenics. It provided an intensive comparative analysis of the understanding and use of word meanings. Eight hypotheses concerning alleged specific distortions in the schizophrenic's understanding of word meanings were tested. The performance of forty matched pairs of schizophrenics and control subjects on a special battery of verbal tests was compared. Each pair was matched for





score, age, sex, and educational level. All tests in the special battery were built around a common core of 25 familiar words. The battery included tests of definitions, synonyms, sentence construction, similarities, analogies, and word association.

A comparison of the performance by the normals and schizophrenics showed the following differences: (a) The schizophrenic was significantly less precise in his understanding of word meanings. This was most evident in his relative failure to differentiate between word meanings. (b) The schizophrenic was less able to use his words as conceptual instruments, e. g., his ability to form verbal concepts and to reason in analogies tests appeared impaired. (c) The schizophrenic's ability to integrate words into meaningful communications appeared impaired, although he may "define" the same words in the same way that the control subject does.

Moran concluded that, "These results support the theories of Yacorzski, Cameron, and Goldstein concerning the nature of the schizophrenic's understanding and use of word meanings." It was noted, however, that the differences in the schizophrenic's understanding of word meanings were not large enough to be diagnostic. Despite group differences, there remained an extensive "overlap" in group performances of the schizophrenic and normal groups.

In an investigation of the vocabulary performance of schizophrenics, Moran, Moran, and Blake (45) studied the qualitative factors. The Wechsler-Bellevue vocabulary test was administered to a matched group of normals and schizophrenics. The following "clues" were derived from a qualitative analysis of the results:

1. Neologisms: (brim = obtruding object)

2. Peculiar verbalization: (join = join to, some segmented instance)
3. Incoherent, bizarre: (microscope = germ under eye tooth)
4. Irrelevancies: (bacon = thinly sliced meat, animal meat usually)
5. Perseveration
6. Clang: (chattel = talk, chatter)
7. Personal reference: (cushion = something, I'm not sitting on)
8. Distant: (seclude = office affair)
9. Fabulizing: (nail = nail these things -- grow inward and outward and grow sores)
10. Wild guesses: (affection = something of a light)
11. Loose, expansive: (microscope = a scientific invention)
12. Vague, confused: (plural = stands for some word of some kind)
13. Concrete: (join = to join a club or something)

Whiteman (56) hypothesized that the schizophrenic deficit relative to normals is greater on social conceptual problems than on formal conceptual problems. By "formal" he meant an abstraction which is common to a number of non-interpersonal situations, and which is capable of describing aspects of such situations in (a) physical, psychophysical, or quantitative terms, such as volume, color, and number, or (b) logical relational terms, such as concepts based on principles of hierarchical classification like species-genus, or relational concepts like "middleness." By a "social concept" Whiteman meant an abstraction which is common to a number of situations involving people, and which is capable of describing aspects of such situations in terms of the functional relationships exhibited by people in their mutual interaction.

Two formal concept tests (one verbal and one performance) and a

pictorial social concept test were administered to 31 schizophrenics and 31 normal controls matched with respect to age, education, sex, and vocabulary score. The populations were then equated statistically and through direct matchings on the formal concept scores.

Significant differences in favor of the controls were obtained between the two groups on both types of test. However, schizophrenic decrement on the social concept test proved significantly greater than decrement on the formal concept tests. This differential decrement obtained whether timed or untimed scores of the social concept test were used as dependent variables.

Whiteman concluded from his results that, "As an explanatory hypothesis, the concept of impairment of an abstract attitude is, by itself, insufficient to account for the selective schizophrenic impairment on the social concept test. The latter decrement has been interpreted as lending presumptive support to a theoretical position which also stresses the importance of social withdrawal as a detriment of cognitive functioning in schizophrenia."

Meadow, Greenblatt, and Solomon (42) designed an experiment to test the hypothesis that the concepts, "looseness of association" and "impairment of abstraction," refer to closely related empirical phenomena. Thus, the experimenters were attempting to integrate two heretofore separate, theoretical interpretations of the intellectual defect in schizophrenia.

The procedure consisted in correlating several tests of "impairment of abstraction" with a test of "looseness of association." All tests were administered to each patient twice within a two-week period to determine reliability.

The tests selected for "impairment of abstraction" were an object sorting, a neutral and emotional proverb test, and the similarities test of the

Wechsler-Bellevue. For "looseness of association," a free verbalization test was devised, and a measure of looseness of association derived from it. The procedure for administration consisted of a modified Freudian free association method. An index of "looseness of association" was derived from an analysis of the protocols of the free association test.

The data indicated that the greater the "looseness of association," the greater the impairment in abstraction. Correlation coefficients ranged from .27 to .68. The results were interpreted by the writers to suggest that impairment of abstraction and looseness of association were closely linked aspects of thought disturbance in chronic schizophrenic subjects and probably characterized those patients with poor prognosis.

Chordoff and Mussen (22) reported on a study of the qualitative aspects of vocabulary responses of normals and schizophrenics, but they used a substantially different technique and different tests than did Moran, Moran, and Blake in a previously reported experiment. Forty schizophrenics and forty normal subjects were equated in sex, age, and education. The tests used were the Shipley-Hartford Vocabulary and Retreat Scale, and a specially constructed vocabulary test. In this latter test, each vocabulary item was accompanied by four correct definitions, each of a different type, and subjects were instructed to choose the best one of the four correct responses. For each word, 86 in all, class, description, example, and function definitions were constructed. For example, the word "ball" was defined as: (1) athletic equipment (class); (2) round and made of rubber (description); (3) baseball (example); and (4) to play with (function).

Comparisons of the responses of the two groups showed that schizo-

phrenics selected a significantly greater number of function and example types of definition. These were considered inferior types of definitions. Normals chose significantly more class definitions which were considered superior definitions. Description definitions were chosen with about equal frequency by both groups.

The order of preference for the definition type were about the same for the two groups. Both groups selected class and description types of definition more frequently than the other two types. Among the description definitions, those selected more frequently by schizophrenics tended to be of a low conceptual level, whereas those selected more frequently by normals tended to be of a higher conceptual level.

The correlation between the conceptual quotient of the Shipley-Hartford Vocabulary and Retreat Scale and the frequency of selection of each definition type revealed that with increased deterioration or loss of mental efficiency, there was an increased tendency to choose inferior definitions.

These findings led the writers to conclude that, "The vocabulary of the abnormal or deteriorated patient merely appears unchanged; actually it is qualitatively different from the vocabulary performance of normals. Clinically, this would seem to mean that a patient's vocabulary test score alone gives an inadequate picture of his performance. Qualitative aspects and the conceptual level of his responses must be considered."

In a very provocative study of schizophrenic language and thought in a test of imagination, Balken (18) developed a technique requiring a response which recombined and reintegrated past experiences in a novel way. Thus, the subject was called upon for considerable neo-cognition or generation of new

cognition. It also permitted responding with reproductive cognition to an appreciable extent, such as autobiographical or biographical anecdotes. Balken concluded that, "The content of the verbal productions of the schizophrenic patient is derived almost exclusively from reproductive cognition."

The rationale for this conclusion by Balken stems from the schizophrenic's perception of the world and of himself. To the schizophrenic patient, the external world is a dread, undifferentiated infinitude which fitfully, haphazardly, and accidentally calls forth items from the undifferentiated infinitude of past experiences. Balken contends that most of these items have been mainly and merely "lived" experiences; this is especially true of those items that pertain to affect and to intra-and-extra body sentience -- items that never possessed the qualities of clearness and determinateness and direct or inferential awareness, which reproductive cognition must possess if it is to serve as a basis for the generation of new cognition. As a result, many of the items evoked by the undifferentiated infinitude of external reality have been directly or inferentially apprehended or "known" and may or may not have attained the level of verbal awareness and verbal articulation. It would follow, then, according to Balken, that all types of items tend with the passage of time to become less and less determinate, and with this lessening of determinateness and clearness tend to become more and more equivalent. In addition, they become fused with late experiences of both the "lived" and directly or inferentially apprehended types. Thus, experiences from all levels of development tend to merge into an undifferentiated mass in which there are neither similarities nor differences.

The schizophrenic is stirred to action by an anxiety which may or may

not have been accentuated by the circumstances of the new situation. However, anxiety restricts awareness of distinctions between the self and objects, and affects and strivings in and of themselves do not provide even a very rough guide to action -- they indicate that something must be done but not what is to be done. As in the normal, the schizophrenic applies items from his vast repertoire of sensuous, somatic, imaginal, and emotional material. But their application is fitful, hit-or-miss, and ineffective, and without awareness of distinctions between himself and others and without awareness of the ends necessary to alter the situation which is affecting him -- and with time but an endless lethargy, having no past, present, or future -- his utilization of past experiences, both "lived" and "known," never attains the qualities necessary for the apprehension and integration of new relations. Consequently, anything of any nature from the dread external infinitude can evoke anything of any nature from the equally dread, internal, undifferentiated infinitude of items indiscriminately fused from all levels of experience. Schizophrenic experience is thus merely relived "lived" experience.

Balken then concludes:

The widely accepted views regarding the basic disturbance in schizophrenia may be revised in line with the many evidences presented. The evidences are, perhaps, redundant and overlapping and at the same time involve many omissions or reservations and qualifications of interpretation. Nevertheless, in relating these evidences one to the other and to other psychological evidence, as well as to the clinically, empirically established facts regarding the peculiarities of schizophrenic language and thought, it becomes apparent that the basic disturbance in schizophrenia is in the "psychological relation," or in the awareness of distinction between subject and object, and not an "inability to categorize" or a "regression to prelogical thinking" or the like. (17)

In 1945 Schafer (49) presented a study of thought processes in a word association test on the basis of the then unpublished work being done by him-

self, Rapaport, and Gill at the Menninger Clinic. According to Schafer's manner of evoking the thought processes which occurred in the course of a word association test, these processes had an analytic and a synthetic phase. In the analytic phase, the stimulus idea was broken down into its memory and failing connotations. Although these connotations were not usually consciously discriminated or verbalized, they constituted the material from which a response evolved. In the synthetic phase, a final choice of idea and its verbal formulation came about.

The course of the associative process was directed by a number of determinants. First, the nature of the stimulus material: in the word list Schafer used, the stimuli were mostly nouns, and he found that the preparatory and final associations dealt to a large extent with nouns, that is, the names of objects and their connotations. The second determinant was the test instructions: he emphasized speed, one-word reactions, and no selection of responses, but rather the first word coming to consciousness. The subjects, however, usually interpreted the instructions to mean that their associations must "make sense." The results seemed to indicate that even subjects who did not care about making sense nevertheless had associations which followed a course of acceptable conceptual relationships. The third determinant seemed to be the emotional memories of past experiences of the subject which were the main source of associative material. The fourth determinant indicated that the conventional conceptual patterns which the thought process appeared to follow made for much inter-individual identity of response. The fifth determinant was the emotionally-rooted anticipations of the subject: the selection of memories and final responses fulfilled the anticipation associated with each stimulus idea.



The sixth determinant was the degree of disorganization of thinking present and the extreme in which it took its form. This disorganization could be manifested by blocking, inertia, or in a loosely knit, fluid train of associations. Blocking made for responses conceptually close to the stimulus word, while extreme fluidity made for responses conceptually distant from the stimulus word. The seventh determinant was the presence or absence of conflict or high emotional charge in connection with the stimulus idea; stimulus words with connotations touching upon usually conflict-arousing sets of ideas (sexual, aggressive, paternal, etc.) were the most likely to disrupt the associative process and made for aberrant reactions.

Schafer concluded, "In general, the stronger the defense of the ego, the more will the attitude of conforming with the instructions and adhering to conventional conceptual patterns dominate the course of the associative process; the weaker the defenses of the ego, the more will deep-lying affects or repressed ideas push their representatives into consciousness, or at least signal their presence by disturbing the associative process and causing a departure from conventional conceptual relationships."

In a clinical evaluation of a word association test, Schafer (49) felt that the test found its most fruitful application when analyzed in terms of the relationship between stimulus and reaction words. Normal subjects, and to a lesser extent, neurotic subjects adhered to conventional conceptual relationships in their reaction. This concept-formation aspect of responses appeared automatic. The disturbances in formal relationships took the form of adhering closely to the stimulus word, or wandering too far away from it before a reaction was verbalized. A massing of either of these usually indicated a

psychosis, although even a few extremely distant reactions -- but not too extreme -- were usually symptomatic of the presence of conflict with respect to the ideas connoted by the stimulus word involved. Other symptoms of disturbance, specific or generalized, could be seen in long reaction times and false reproductions of the original reaction words. Schafer concluded, "The hope that association tests can directly elicit content of the subject's conflicts which will be clear in his choice of reaction word should be abandoned and attention focussed on the thought processes of the subject as they find expression in the associative processes set off by the stimulus words under standard instructions."

Rapaport, Gill, and Schafer's (13) approach to the word association technique and its application for clinical and/or diagnostic purposes involved the usual Jungian technique. However, from Orbison's original list, the writers derived a sixty word list which they administered to one hundred and fifty subjects and various clinical groups.

From the data elicited, Rapaport, Gill, and Schafer trichotomized the associative process into three separate phases. Mind-set or anticipation was listed as the first phase, and this was the result of the instructions given to the subjects. The second phase of the associative process was called "analytic." The subjects unconsciously analyzed the stimulus word in terms of past memories, either in the form of ideas or affects. The third phase was called the synthetic phase in which a preconscious determination to choose one response word which met the requirements of the test instructions was involved. The writers hypothesized that in the synthetic phase, conventional responses would be elicited from normal persons.

Disturbances in any one of the three associative phases were consider-

ed of greater diagnostic significance than the response word itself, and theoretically these disturbances reflected some conflict or a weakness of the ego. The responses themselves were analyzed in terms of five categories: (1) close reactions or halting of the analytic phase; (2) distant reactions, or interference in the synthetic phase; (3) content analysis, or massing of disturbances in a group of responses; (4) reproduction disturbances; and (5) the complex indicators.

The writers reported their findings in terms of percentage comparisons between various clinical groups and the group of 151 highway patrolmen who served as their normal sample. They were able to discriminate between normal and abnormal subjects on the basis of the word association test but felt that no generalizations could be made because of limited sampling.

Bruner and Postman (20) studied the emotional selectivity in perception and reaction. They administered a 99 word word-association test to 19 Harvard and Radcliffe undergraduates. An analysis of the data indicated that variations in associative reaction time were intimately linked to alterations of perceptual responses to emotionally charged stimuli. Both perception and association appeared to be governed in emotional situations by a common set of principles. According to Bruner and Postman, "The equivalence of perceptual defense and associative blockage is apparent. Suggestive parallels to perceptual sensitization are not lacking among the phenomena of associative reaction." Abnormally short reaction times, fast clang reactions, and rapid repetitions of stimulus words were regarded by the writers as manifestations of reactive sensitizations. Sensitization and defense were considered as principles applicable to both perceptual and reactive behavior. Thus, the authors felt that in the

service of a central process -- adjustment to potential anxiety -- both perception and association functioned equivalently.

Erickson and Lazarus (25) compared perceptual defense by means of projective tests. Thirty-five psychoneurotic patients and a like number of college students were used as subjects in the study. They were administered an especially constructed word association test of 89 words. It began and ended with ten neutral words, and an additional ten neutral words occurred in the middle of the list. Ten aggressive, ten succorant, and ten homosexual words were scattered throughout the series, separated by additional neutral words. In addition to the word association test, a Rorschach concept choice test which resembled the testing of the limits technique was given each subject.

Analysis of the data showed that disturbance scores on the word association test for aggression and succorance were significantly related to the tendency of subjects to reject corresponding concepts on the Rorschach test. The experiment confirmed the familiar clinical belief that failure to make certain kinds of interpretations of projective material may reflect emotional disturbance toward that material.

Weider, Mittleman, Brodman, Wechsler, and Wolff (54) developed a word association test for screening purposes and called it the Cornell Word Form. An earlier form had been used by the military in screening psychologically unfit recruits at induction stations. The authors felt that the feeling tone of the responses, as well as the commonness or uncommonness of responses, reflected an individual's adjustment to life situations. From a previous study the authors analyzed 180 stimulus words and found 29 words which discriminated significantly at the .01 level of confidence between a group of 100 civilian psychiatric

patients and a normal civilian group. The authors added 51 "buffer" words, making a total of 80 stimulus words and 160 response words. The task for the subject was to choose the response word which reminded him most of the stimulus word. An analysis of the test scores of seventy medical students and thirty nurses yielded a test-retest reliability coefficient of  $r=.80$ , when the eighty words were administered one week apart.

Saslow and Shoebe (48) administered the Cornell Word Form to 337 psychiatric patients, hospitalized and nonhospitalized, and to one hundred normals. They were able to screen 53% of the patients, but only 32% of the one hundred normals.

Several studies on the effect of convulsive therapy and hypnosis on word association are reported in the literature. Janis (31) studied the changes in word association reactions produced by electric convulsive treatments. Seventeen mental patients who received a minimum of ten electric convulsive treatments were given a word association test before the electro-shock series began and again four weeks after the series ended. An equated control group of 17 patients who received no form of shock treatment during a comparable time interval was also administered the word association test.

Janis found no reliable change on any of the following measures of delayed reactions: (a) responses delayed for three seconds or more; (b) responses delayed for five seconds or more; (c) failure to respond within the 45 second time limit. It appeared, therefore, that electric convulsive therapy had no observable effect upon the frequency with which delayed associations occurred. However, the electric convulsive therapy group exhibited a slight but statistically reliable increase in certain types of deviant associations: (a) remote or

idiosyncratic associations; (b) stimulus repetitions; and (c) multi-word responses.

The electric convulsive therapy group exhibited a statistically reliable increase in defective reproductions of the word association responses, indicating that as a result of electro-shock treatments, the patients tended to give a poorer performance on the reproduction test.

From a qualitative examination of the three types of deviant associations which were found to increase following electric convulsive therapy, it appeared that a primary characteristic was failure to maintain the "task-set" (imposed by the word association test instructions) which was necessary for producing habitual association responses. The results on defective reproduction of word association reactions were consistent with this interpretation on the assumption that if the "task-set" was not maintained, the associations were not likely to be stable, habitual ones. Consequently, Janis felt the results of this investigation lent tentative support to the following hypothesis, "The post-treatment amnesias and related difficulties in producing personal memories following electric convulsive treatments may arise from a basic disturbance in recall processes, consisting of an increased tendency to produce spurious, irrelevant associations which interfere with the production of the habitual associations necessary for evoking the recall of personal past experiences."

Graham (28) used the Kent-Rosanoff test in a battery designed to measure the effects of insulin therapy. The battery included an abbreviated form of the Stanford-Binet test, the Rorschach test, and a group form of the Kent-Rosanoff test. Fifteen patients were tested before and after insulin therapy. Graham found that in general the patients averaged more common and

fewer individual responses on the word association test after insulin treatment than before.

Schneck, Shakow, and Lively (51) utilized the Kent-Rosanoff test, in conjunction with other personality indices, in an attempt to measure changes produced by metrozol and insulin therapy. Their attempt to use the word association test for prognostic purposes in shock therapy was not successful.

In a study of the effect of hypnosis in relation to the word association test, Kline and Schneck (34) utilized ten psychiatric patients and ten students. The writers used a modified form of the Rapaport technique. Instead of using first the associative phase followed by the reproductive phase, the associative phase was given twice in consecutive administrations. Test responses were evaluated for (a) reaction time disturbance; (b) associative alterations, and (c) qualitative association disturbances. The results indicated that whenever hypnosis was introduced into the testing situation, similar trends in response patterns were noted among both the patient and nonpatient population, although the tendency was toward a more marked variation in the hypnotic patient group. Major indications included (a) a marked increase in the incidence of associative alternations in the hypnotic administration; (b) increase in the percentages of fast reaction times and a decrease in slow reaction times in the hypnotic administration.

Wyatt (56) made an analysis of the relationship between education and word association, although his main concern was to determine whether an abridged analysis of a free word association test could yield as valuable results as would an elaborate analysis. Two parallel forms of a free association test, each containing 110 words, were administered in group form. The instructions

were that the subject write down the first word which the stimulus word brought to mind. The first test was administered to 446 subjects, 75 of each sex from seventh grade, 87 of each sex from high school, 26 of each sex from college, and 35 of each sex from business. The second test was given to 510 subjects, 80 of each sex from seventh grade, 87 of each sex from high school, 53 of each sex from college, and 35 of each sex from business.

From an analysis of the results, Wyatt concluded that a wide range of stimulus words with a shortened analysis, confined to the most sex-contrasting responses, was more informative than a full analysis based on a narrow range of stimulus words.

An analysis of the responses of the male group indicated that the seventh grade group possessed more marked preference for male person associates than the college group. The business group obtained more typically male responses than the male college group. The female business group seemed to prefer adornment and dress associates more distinctively than either the high school or college groups.

In 1929 Miles and Terman (43) surveyed the reported differences between the sexes in the association of ideas as demonstrated by the traditional type of word association. This analysis pointed up two factors. First, significant sex differences were observed in the quality of word associations. Second, considerable differences were found between the respective fields of interest for males and females who were considered representative of the general population.

Several specific differences between the sexes were discovered. The males showed a slight tendency to be more superficial in their cooperativeness



in responding to the test. However, the males possessed greater objectivity, logic, and cool judgment, compared to females who displayed more subjectivity, personal evaluation, and warm appraisal. Sex differences in regard to the extent of interest were found to be negligible when groups of adequate size and equality of status were compared. With regard to character of interest, wide sex differences prevailed similar to those found when occupationally variant groups within a single sex were compared. From the results, Miles and Terman concluded that definite sex differences existed in the association of ideas as revealed by the usual word association technique. These differences could not be attributed, however, to primary innate tendencies or to current social customs.

Noh and Guilford (47) utilized a method of continuous lists rather than the usual word association technique in their study of sex differences. In the continuous list technique, the subjects were asked to write one hundred words as rapidly as they could. For their study, Noh and Guilford used two groups: one group consisted of twenty men and twenty women, and another group of thirty men and thirty women. Their response words were tabulated under 25 headings following a classification by Jastrow. Words which appeared once in the entire number of lists were defined as "unique."

The results of the study by Noh and Guilford did not entirely confirm the findings of the earlier research. Contrary to the findings of four previous investigations, Noh and Guilford found that men had less community of response and only a slightly greater range of ideas than women. However, the writers believed that sex differences in community of ideas would decrease if the sizes of their groups were substantially increased. They also believed

that there was some indication that the sexes were becoming more alike in the kind of associations given as compared to the less similar associations found in other studies. They felt, nevertheless, that there was a definite trend apparent for men to give more concepts connoting activity in contrast to more static concepts given by women. Noh and Guilford also found that women completed their lists in less time than men. They found this important because those lists which were finished in the shorter time possessed greater community of response. Noh and Guilford inferred a causal connection between this relationship and the greater community of ideas of the female group.

The three previously mentioned modifications of the word association technique dealt primarily with the analysis of the responses. A fourth modification, more recent in origin than the others, involved a modification of the presentation of the stimulus. Previously, the subject was asked to choose the first response that came to mind. In the fourth modification, a "control" was placed upon the subject. The subject was instructed to choose from two or more possible responses which were presented to him. It was thus hoped to establish a framework within which a more objective, easily measured word association technique could fulfill the hopes originally felt for the free word association technique.

Maller (40) is generally credited with developing the first controlled association test as a modification of the traditional word association test. He developed two equivalent forms, A and B, each consisting of a list of two hundred stimulus words. Each stimulus word was followed by a pair of words which represented a normal and an abnormal association; e.g., girl: woman, unhappy. The subject underlined the word in each pair most closely associated in his mind

with the key word. The number of abnormal words underlined represented the subject's total score.

Malamud (39) used Maller's controlled association test Form B in a study on its use as a screening device. The test was administered to 150 normals and 150 psychotic patients. When the results were scored for the total number of abnormal associations underlined, it was possible to identify 63% of the patients at the expense of misidentifying 25% of the normals. The difference between group means proved statistically significant. Scored in this manner, the test appeared valid for determining group differences in degree of maladjustment but was not sufficiently discriminating for screening out individuals.

Item by item comparisons of the associations chosen by one hundred normals and one hundred abnormals resulted in differential weighting of 88 items. With rescoring of these items and establishment of a cutting score of seven, 87% of the one hundred patients were identified and 23% of the one hundred normals misplaced. When tested on new groups, weighted scoring resulted in 78% of fifty abnormals and 22% of fifty normals obtaining scores at or above the critical score. These results possessed fairly satisfactory stability and showed considerable promise for individual as well as group diagnosis.

The split-half reliability coefficients corrected by the Spearman-Brown formula were .79 for one hundred normals, .94 for one hundred abnormals, and .91 for the two hundred normals and abnormals combined. These reliabilities, according to Malamud, appeared fairly satisfactory for individual diagnosis.

The mean weighted score of one hundred and fifty normals was 4.19.

that of thirty good status patients was 12.16, and that of 48 poor status patients was 28.24. The difference between these means was in every instance statistically significant.

Malamud concluded that, "The controlled association test appears to possess sufficient validity and reliability as a screening device to warrant further study. Its effectiveness with nonhospitalized neurotics and the possibility of significant sex differences on individual items ought to be investigated. A multiple choice word association test bearing a multiscore character similar to that of the Minnesota Multiphasic Personality Inventory or the Strong Vocational Interest Blank may be devised for use both in the clinical and industrial fields." (39)

Crown (23) modified Maller's test by selecting fifty of the most discriminating items. He called this revised test the Word Connexion List and attempted to establish the validity of this test for the gross screening of neurotics. The experimental group for this study consisted of two hundred neurotic patients at the Maudsley and Sulton Neurosis Hospitals, approximately thirty of these being females. The control group consisted of one hundred workers in a large industrial firm, and one hundred friends and relatives of students in a psychology class. Approximately 50% of the controls were female. In order to determine whether this mixing of the sexes could be experimentally justified, mean scores were calculated for a group of 82 females and 77 males among the controls. The difference between the two means proved to be insignificant.

Intelligence and vocabulary tests were also given to one hundred and fifty of the neurotic subjects. A significant but low negative correlation was found between scores on the Word Connexion List and intelligence level, al-

though there was no correlation between the Word Connexion List and vocabulary tests. Differences between the mean scores of neurotics and controls were highly significant.

An extensive item analysis was carried out, and the validity and reliability were investigated first on tests composed of the best one hundred items and then on the best fifty items. It was concluded that the item analysis tends, although not invariably, to raise the validity of the test slightly. The fifty item test appeared sufficiently reliable and valid for use as part of a battery of neuroticism tests, although further research is needed to confirm the power of the test to detect nonhospitalized neurotics among unselected groups.

In 1952, Crown (24) reported the findings from 28 independent pieces of research which had used his Word Connexion List. Based on the combined data from these 28 pieces of research, Crown determined the following means and standard deviations: psychotics ( $N = 169$ )  $12.1 \pm 6.8$ ; neurotics ( $N = 271$ )  $14.7 \pm 7.1$ ; and normals ( $N = 2,840$ )  $9.9 \pm 6.1$ . Thus, psychotic groups, depressives and schizophrenics, tend to score lower on the Word Connexion List than the neurotic groups. This finding, according to Crown, supports the hypothesis that the variation from normality of the psychotic and neurotic illnesses is along different, uncorrelated dimensions.

Normal samples from the general population showed a considerable range in scores on the Word Connexion List. Crown felt that this finding may, in part, be due to variations in intelligence between the groups, but emphasized the necessity for caution in drawing conclusions from the results of single investigations where the test performances of normal and abnormal groups are concerned.

Crown concluded that, "The screening efficiency of the Word Connexion List is probably not good enough for it to have more than a suggestive value in individual screening and selection work."

Baker and Elliott (17) investigated reaction times differences in controlled and free association tests using identical stimulus words. For this purpose stimulus words were selected which elicited large percentages of common responses. Each of these stimulus words was presented to half of the subjects under free conditions and to the other half under controlled conditions. Mean reaction times were computed for the responses under each condition; differences between these means and their statistical significance were also determined. Of the 16 mean reaction times under both conditions, all were shorter in the controlled than in the free situation.

Baker and Elliott felt that the effect of the instructions given in a controlled word association test was to quicken the response time. This held for both opposite associations and part-whole associations, and there did not appear to be any evidence suggesting that it would not hold for other types of associations as well.

The expectation of relatively rapid response times, even under free conditions, was borne out when Baker and Elliott compared the free association times they obtained with those reported elsewhere. The writers felt that quite likely the additional quickness attained under controlled conditions might be due to additional restrictions. In effect, there were two types of restrictions operating: (a) the restriction due to acquired familiarity with the associations, and (b) the restriction due to the instructions to respond in a particular manner.

Baker and Elliott felt that no sufficient explanation could be ascertained to explain the greater proportionate decrease in reaction time for the part-whole associations due to the controlled situation. However, they do suggest three possible reasons: (1) Since the opposite association possessed greater original restriction -- larger percentages of common responses under free conditions -- than did the part-whole associations, the relative importance of introducing additional restriction in the controlled situation may have been less; (2) Since the opposite association times under free conditions were nearer the physiological limit than the part-whole times, the difficulty of reducing those times even further may have been proportionately greater; (3) The associative process required to arrive at opposite relationships may not be amenable to controlling instructions as are those required for arriving at part-to-whole relationships.

In 1951 at Stanford University, Keene (57) studied the use of responses on a word association test as indicators of emotional adjustment. In this study Keene attempted to refine the word association technique in order to increase its value as an indicator of less extreme degrees of emotional maladjustment than that of the mental hospital patients used by Kent and Rosanoff. Keene employed 192 words in his word association test. These included the Kent-Rosanoff list, nonidentical words in the Jung list, and certain words from the third five hundred in frequency from a list by Thorndike. He administered this combined free word association test to five hundred Stanford University students. The female subjects were rated for degree of emotional adjustment by the Dean of Women, and the male subjects by the Director of the University Health Service.

The 96,000 responses of the 500 students were scored in four different

ways: (1) all responses of the 500 subjects; (2) the three most common responses occurring in the 500 subjects; (3) the Kent-Rosanoff frequency tables; and (4) a list of the three most frequent responses in a study by Schellenberger. High intercorrelations were found among these four scoring methods. In terms of his purpose for the study, Keene found that none of these scoring methods revealed significant differences between those subjects rated as emotionally adjusted and those rated as emotionally maladjusted. Correlations between word association scores, the Bernreuter Personality Inventory, and the Thorndike College Aptitude Test were all near zero.

During the following year, the same test was readministered to 258 of the original group, and two years after the original administration, 117 were again retested. The coefficients of correlation between scores for the two testings ranged near  $\pm .65$ .

At the University High School, Oakland, California, Keene administered his word association test to 118 seniors. Again, high intercorrelations for different scoring methods but insignificant correlations with ratings of emotional adjustment were discovered. To a third group of 154 junior college students, Keene administered his word association test, the Bell Adjustment Inventory, and the A. C. E. Test. The data again confirmed the high intercorrelations among different scoring methods with little correspondence between emotional adjustment and word associations.

In analyzing the results, Keene concluded that, "The results of this study, while indicating a definite consistency in the response patterns for different individuals, are such as to lend only the slightest support of the use of word associations as a screening out of the moderately maladjusted. The



general and consistent tendency for an individual to give the same type of responses on repeated tests justifies further study in this area, in spite of the fact that the results of the particular study fail to support any of the claims of the more enthusiastic users of the device." (57)

The present study, utilizing the Loyola Language Study as its testing instrument, is a continuation of the original experimentations begun in 1953 at Boston State Hospital, Boston, Massachusetts, and one of several simultaneous studies now being conducted at Loyola University, Chicago, Illinois. Johnson and Snider (61) originated the modification of the free association technique and collected a normative sample at Boston. The authors hypothesized that normal people should be able to compare their own ideas with the ideas of others, and thus respond in common with them. Continuing this rationale to its logical conclusion, those persons who are mentally ill, and thus less adjusted to the world about them, should not be able to yield common responses with the facility of a normal person. This lack of "commonness" then should yield itself to measurement from which statistical comparisons could be made.

Johnson and Snider originally collected two thousand samples from a normal Boston population, from which a stratified random sample which controlled age, sex, and education was assembled. The test records of four hundred males and four hundred females were used as the normative population.

Every response to each of the eighty stimulus words was tallied and assigned a derived score. These score values then served as the norms for scoring the test records of the eight hundred normal records. Lower score values represented higher frequency responses; thus a lower total score revealed closer conformity to more common responses. Conversely, a higher score indicated a

less common response.

Snider (59) later administered the Loyola Language Study to 78 psychotic female patients at the Boston State Hospital. In comparing the test records of these patients with the test records of 399 normal women, he found that 70% of the hospitalized group fell below the tenth percentile of the normal population. Thus, except for one individual, the remaining patients fell below the fiftieth percentile of the normal group. This one exception was found to be a patient who held a somewhat responsible position in one of the hospital offices.

Table IV indicates a comparative analysis of Snider's findings between the 399 normal women and the 78 female patients based on a critical ratio analysis.

TABLE IV

A COMPARATIVE ANALYSIS OF THE LOYOLA LANGUAGE STUDY RECORDS BY SNIDER OF 399 NORMAL FEMALES AND 78 PSYCHOTIC FEMALES

| Group    | N   | Range       | Mean | $\sigma$ | Critical Ratio | P    |
|----------|-----|-------------|------|----------|----------------|------|
| Normal   | 399 | 1100 - 2400 | 1617 | 255.00   |                |      |
| Abnormal | 78  | 1480 - 3117 | 2134 | 365.26   | 11.95          | .001 |

In a still unpublished dissertation, Stanek (62) duplicated on a Chicago population the normative study by Johnson and Snider at Boston. Utilizing a modified stratified sampling, based on the 1950 census, he collected four hundred normal male records and four hundred normal female records. The age range extended from 19 through 54 years, inclusive, and the grade levels

extended from the sixth year through the sixteenth. For comparative purposes in the analysis of age and/or education test scores, Stanek trichotimized the age levels to include these ages: 19 through 30, inclusive; 31 through 42, inclusive; and 43 through 54, inclusive. The grade levels were divided into these four groups: 6 through 8 years, inclusive; 9 through 11 years, inclusive; 12 through 14 years, inclusive; and 15 through 16 years, inclusive.

Stanek utilized a different and much simpler method of scoring than did Johnson and Snider in their normative study. His scoring, based on the combined efforts of C. I. Doyle and V. V. Herr, was based on the principle of geometric progression. By subjecting the raw scores to a square root transformation of the percentages of the frequencies, Stanek was able to reduce the disproportionate weighting of a few top frequency responses, since the distribution frequencies revealed a J curve with a quite extended scatter of extremely low frequencies.

In analyzing the data, Stanek found that the overall mean scores for the three age groups, regardless of educational level, revealed a consistent though irregular trend for test scores to decrease as age increased for both the male and female population. With respect to education, as the educational level increased, the group mean scores increased for each level irregularly but consistently for the male population. The same held true for the four educational levels of the females with one exception; i.e., between the college and superior levels. Stanek attributed this discrepancy to the small size of the higher grade level samples. Thus, Stanek's results indicated that age bears an inverse relationship to scores on the Loyola Language Study. This is interpreted as meaning that with increasing age a person gives fewer common responses. In

comparing sex differences, the females attained higher scores than the males. However, Stanek felt that this difference was significant because of possible uncontrolled selection factors.

Stanek drew the following conclusions on the basis of his study:

1. As measured by the Loyola Language Study, the group characteristics of age, sex, and education significantly affect communality of thought.
2. There is an inverse relationship between age and communality of response; that is, the older the individual, the less common are his responses.
3. Females give more common responses than do males.
4. There is a direct proportion between communality of response and education; that is, the higher the education, the more common the responses.
5. The norms established may be used as a basis for future study with other groups.
6. Other variables, such as race, national descent, geographical regions, etc., may have significant influence on the discriminative ability of the Loyola Language Study.
7. The nature of the test lends itself to use as a screening device or in personnel selection.

In summary, the review of literature has indicated, in general, that the word association technique has not fulfilled the anticipated major role that its early advocates had hoped it would play in psychology and psychiatry. The vast amount of study applied to the word association technique has resulted in various modifications in its application, its techniques, and some general findings which lend themselves to further research and refinement.

One early major finding, which has been verified by several later

workers, revealed the tendency for normal individuals to give identical responses to the same stimulus word. This finding has been the basis for a great deal of investigation involving the study of the mentally ill. This fact followed quite naturally from the early psychiatric thinking on schizophrenia as being a "loosening of association" and an inability to do "abstract" type of thinking. Studies to date have indicated that schizophrenics and normals are best compared on a qualitative rather than a quantitative basis.

The early finding of "complex" indicators has been verified as to their existence, but there is much less agreement as to their function and identity. The value of the "complex" indicators has been most fruitful in its clinical application by the particularly qualified individual therapist.

Other studies of the word association technique have involved the relationship between sex, age, and education to responses on the word association test. With respect to age, it is generally agreed that children tend to use a more concrete, specific response, whereas adults tend to be more general. Beyond that general agreement, contradictory results have been indicated by different workers on the question of direct proportion between maturation and common responses. Sex differences in word associations are generally found to be a function of the particular age group studied. No differences are noted for pre-school children; grammar school boys possess more common responses than girls, while the reverse is true of adult men and women. Very little correlation has been found between education and word association responses.

A recent modification introduced to the word association technique has been to employ a "controlled" element. The former modifications did not alter the "free" technique itself but merely modified the analysis of the data

elicited. In the controlled word association tests, the subject is "forced" to make a choice between two or more responses. On the basis of these choices, the subject is then scored according to the "type" of selection made. In general, the results of the studies on the controlled type of test have shown some degree of reliability, but none has proved sufficiently reliable to be utilized as a diagnostic or clinical instrument.

Perhaps the difficulties encountered to date do involve still untested problems of geographical influences, socio-economic status, and the very changing of word usages themselves from year to year. Some writers have expressed these views.

In spite of the somewhat disappointing results to date, the word association technique continues to be a center of interest for many researchers. This indicates that many still believe in its efficacy as a "revealer of the uncharted depths of the mind." The word association technique gives the hope of being the vehicle of a great deal of progress in psychological research. The ability to regulate and understand its basic functions still remains to be solved.

## CHAPTER III

### PROCEDURE

Due to the recency in development of the Loyola Language Study, the writer will describe in some detail its development, rationale, and the modifications in instructions which create a mind-set differing from all other word association techniques.

The eighty words used in the Loyola Language Study were derived from the Kent-Rosanoff list in random fashion. In originally determining the word order of the Loyola Language Study, Johnson and Snider (61) administered the test in four different forms. First, the eighty stimulus words were divided into four groups of twenty words each. The twenty stimulus words within each group were randomized, and the four groups of twenty words were arranged in different sequential order. By such randomization of words, and variation of order of each block of words, the authors eliminated the possible effect of word order on test responses. The data thus obtained were used as a basis for the form to be accepted for the Loyola Language Study. The form which corresponded best with all other forms of the test was finally selected as the form that is now used in the Loyola Language Study.

The chief modification introduced into the Loyola Language Study consists in the instructions. These instructions, which will be given in detail later in this chapter, require the subject to respond to each stimulus word by giving the one word which he believes most other people would state. The

authors felt that such a mind-set would produce two effects which neither the free association method nor the Maller controlled method would produce. First, the Loyola Language Study would encourage greater reflection before responding, thus allowing more ego-control factors to apply themselves. By calling upon such higher mental processes, such as deliberation, judgment, and choice, the authors believed that the Loyola Language Study would yield more common responses from normal people. Second, the mind-set created by the Loyola Language Study would yield less common responses from the emotionally or mentally disturbed since that person would be subject to less ego-control than the normal person. Furthermore, the authors believed that a less common response score would vary directly with the degree of impairment to ego-control. Since the Loyola Language Study is not a timed test, this factor would also tend to facilitate commonness of response for normals and act as a detriment toward commonness of response for the abnormal since his control factor is impaired and would thus allow more idiosyncratic reasoning and response.

The present study is designed to test the discriminatory power of the Loyola Language Study in schizophrenia. The design of the study is to match a schizophrenic population with a normal population on the basis of sex, age, and education. The normal population was selected from the normal records obtained by Stanek (62) in his investigation of age, sex, and education on responses to the Loyola Language Study. In his study, Stanek's normative population included four hundred male and four hundred female adults drawn from the metropolitan Chicagoland area. Stratified sampling based on the 1950 census figures for Chicago, trichotomized in age and education, formed the basis of study for Stanek's research.



With Stanek's sample as a basis, the next step in the procedure was to obtain a hospitalized schizophrenic population with which to match the normal records. Age limits were established at 19 as the youngest and 54 as the oldest. Grade limits were set at six as a minimum and 16 as a maximum. It was hoped to obtain approximately fifty female and fifty male schizophrenic records which could be suitably scored and used as the experimental group.

Permission was received from Dr. John Cowen, M. D., Assistant Superintendent, Chicago State Hospital, Chicago, Illinois, by the writer to test patients in the hospital wards in late afternoon and early evening of every working day. This time was selected so as to be least disruptive to the patients' routine.

The writer administered all tests either individually or in groups not exceeding four in number. The site for testing was either in the ward doctor's office or in the more spacious solariums for group testing.

The next step after permission for testing had been received involved examining the patients' records for preliminary screening. Over four thousand five hundred records were examined in the preliminary selection of possible subjects. The basis for being selected as possible subjects included being American born, not clinically deteriorated, communicative, age of at least 19 and not more than 54, grade achievement of at least 6 years and not more than 16 years, diagnosed as a schizophrenic reaction, and having had no convulsive therapy during the previous six months. Secondary diagnosis or type of schizophrenia was ignored in this initial selection. From the four thousand five hundred records, some 384 patients were selected. These were sorted as to ward location, and contact was made with the ward attendants for a secondary screening. On the

basis of the attendants' recommendations as to communicability, cooperativeness, and availability, the final selection of approximately 225 patients was made. This allowed more than a 100% margin of error in attendants' judgment of testable patients. This margin of error was not too great since the examiner soon discovered that those patients confined to the "agitated" wards were not apt subjects. They were either unable and/or unwilling to cooperate, or those initially willing to cooperate would soon become so anxiety-ridden that they were unable to write. Hence, all the 108 patients who were finally tested came from locked but working wards.

A very rigid testing procedure was followed in testing the patients. In Stanek's study, a prerequisite for acceptance as part of his normative population was that a record must have had responses to at least 90% of the stimulus words. In this study, a more rigid standard was established in that a 95% response level was required for acceptance. In order to obtain such records, the examiner first spent from five to ten minutes with each subject prior to testing. The examiner was first introduced to the patient by the attendant, after which the examiner asked the patient for his help in a scientific study. This usually had the effect of pleasing the patient, and then he usually began asking personal questions about the examiner or the help that he, the patient, might render. This led to the reading by the examiner and patient together of the following instructions which appear on page one of the Loyola Language Study test booklet:

When people see or hear a word, they often think of another word. If you say the word stem, most people would think of flower. Some, but not the greatest number, might think of pipe, grass, stop, and so forth.

This study wants to find out what word you think the greatest number

of people would be most likely to think of when they see or hear each of the words on the next two pages.

Please write next to each of the words the one word which you think the greatest number of people would be most likely to think of when they see or hear the word in the list. Take as much time as you need to think about the word which seems to you to "go along" with each printed word. Then choose the one word which you think the greatest number of people would be most likely to think of when they see or hear the given word. Write the one word which you choose beside the printed word. Do not skip any word.

Remember, you are not asked to write down just any word that comes to your mind. You should write down the one word which you think the greatest number of people would be most likely to think of.

Aid was rendered the patient in completing the information sheet, page four of the test booklet, in order to indicate to the patient the examiner's complete willingness to cooperate in this task. Beyond this aid, when required, no other information or help was rendered.

Upon completion of the test, or when the patient indicated that he or she could not go on, the examiner looked at the test paper in the patient's presence. If responses were omitted, these omissions were pointed out to the patient, and he or she was asked if he wished to make a response. Usually, the omission was originally a block, but facility with the test allowed him to overcome the block by making a response. In those circumstances when the patient felt that he could not proceed or complete the test, he was asked to rest for a few moments. The examiner attempted to distract him from the task at hand by discussing something concerning the ward, the patient himself, or life in the hospital. After the patient appeared calm enough to proceed, he was asked to continue. In most instances, the test was completed satisfactorily. If the patient was not able to give responses to 95% of the stimulus words, the record was not accepted for inclusion in the experimental group. By this testing

procedure, 56 male records, which could be scored, and 52 female records, which could be scored, were obtained.

These schizophrenics were matched person to person as to age, sex, and education with like members from Stanek's (62) records. The overall plan of statistical procedure involved tabulating the responses in a systematized manner and the application of appropriate statistical techniques for proper analysis of the data. With such statistical procedure, it was hoped to confirm the work of Snider (61) at Boston in his comparison of a normal Boston female population with a schizophrenic Boston hospitalized female population by means of a Loyola Language Study score.

In all, the 216 records contained 17,280 responses to be analyzed statistically. The first step in this statistical procedure involved tabulating every response to each stimulus word. Four tables were established for this frequency tabulation: Male Normals, Male Schizophrenics, Female Normals, and Female Schizophrenics. The frequency of each response was ascertained for each table. In obtaining these total frequencies, the following rules for grouping were followed. Singular and plural nouns were grouped together. The tense and voice of verbs were grouped separately, as also were singletons, (i.e., responses to the same stimulus word that occurred only once), omissions of response, and multiple word responses. However, some logical exceptions were made for certain multiple word responses in terms of acceptability as normal responses. Corned beef, United States or U. S. A., fire engine, and easy chair were considered as examples of "single" acceptable responses. Where other multiple words proved difficult to classify, the following rules were applied:

- (a) If the first and second words were different, e.g., window pane

or river bank, the response was scored as if only the second word constituted the response.

(b) If the two words were two alternate responses separated by a comma or with one of the words enclosed in parentheses, e.g., eat (food) or pane, (glass), the response was scored as if only the second word constituted the response.

(c) If the two words were doubtfully alternate responses and were without a comma or parentheses, e.g., young man or bad taste, the response was scored as a multiple word response.

(d) If the first of the words was an article, e.g., a person or an infant, the article was disregarded in the scoring.

(e) If the first of the two words was a modifier of the second, e.g., not light, no sadness, or very little, the response was scored as a multiple word response.

This system was virtually identical with that used by Smola (58) who, in turn, based his system on that used by Johnson and Snider in their original study with the Boston population.

In previous studies with the Loyola Language Study, Snider, Johnson, Stanek, and Smola used either a standard score technique or a root factor score, both parametric measures. Associated with every statistical test is a model and a measurement requirement. The test is valid under certain conditions, and the model and the measurement requirement specify those conditions. Thus the conditions of the statistical model of a test are often called the "assumptions" of the test. As Siegel states (15), "All decisions arrived at by the use of any statistical test must carry with them this qualification: 'If the model used

was correct, and if the measurement requirement was satisfied, then.....' It is obvious that the fewer or weaker are the assumptions that define a particular model, the less qualifying we need to be about our decision arrived at by the statistical test associated with that model. That is, the fewer or weaker are the assumptions, the more general are the conclusions."

It is true that the most powerful tests are those which have the strongest or most extensive assumptions. The  $t$  or  $F$  tests, both parametric, have a variety of strong assumptions underlying their use. These tests are most likely of all tests to reject the null hypothesis when the null hypothesis is false, when those assumptions are valid. Stated differently, when the research data may appropriately be analyzed by a parametric test, that test will be more powerful than any other in rejecting the null hypothesis when it is false. However, the requirements are that the research data must be appropriate for the test. Siegel states (15) that the following minimum conditions must be satisfied to make the parametric test the most powerful one, and in fact, before any confidence can be placed in any probability statement:

1. The observations must be independent. That is, the selection of any one case from the population for inclusion in the sample must not bias the chances of any other case for inclusion, and the score which is assigned to any case must not bias the score which is assigned to any other case.
2. The observations must be drawn from normally distributed populations.
3. These populations must have the same variance (or, in special cases, they must have a known ratio of variances).
4. The variables involved must have been measured in at least an interval scale, so that it is possible to use the operations of arithmetic (adding, dividing, finding means, etc.) on the scores.

When the assumptions constituting the statistical model for a test

are not met, or when the measurement is not of the required strength, the power of the test becomes indeterminate. It then becomes even difficult to estimate the extent to which a probability statement about the hypothesis in question is meaningful when that probability statement results from the unacceptable application of a test. As Siegel further states (15), "Although some empirical evidence has been gathered to show that slight deviations in meeting the assumptions underlying parametric tests may not have radical effects on the obtained probability figure, there is yet no general agreement as to what constitutes a 'slight' deviation." In commenting on the normal curve and probability, McNemar states (12), "The comparability of two sets of standard scores with the same mean and same standard deviation does not hold for skewed distributions unless the two distributions show the same degree and direction of skewness. This is unlikely to be the case in practice."

In order to avoid the possibility of making any unwarranted assumptions, and thus relieve ourselves of the need to qualify our decisions, nonparametric techniques were used for the statistical analysis of the nonparametric data gathered in this study. Because of the "distribution free" technique of nonparametric statistics, the conclusions that may be reached will be more general in nature, and probably more valid than if a parametric test were used.

The first step in the analysis was to determine which words discriminated at the .01 or greater level of confidence between male normal-male schizophrenics and also between female normal-female schizophrenics. The nonparametric test selected for this analysis of the responses was The Chi-square ( $\chi^2$ ) One-Sample Test. As Siegel states (15), "The technique is of the goodness-of-fit type in that it may be used to test whether a significant difference exists

between an observed number of responses falling in each category and an expected number based on the null hypothesis."

The  $X^2$  test was chosen because the hypothesis being tested concerned a comparison of observed and expected frequencies in discrete categories. The null hypothesis may be tested by  $X^2 = \sum \frac{(O - E)^2}{E}$ . If the agreement between the observed and expected frequencies is close, the difference  $(O - E)$  will be small, and consequently  $X^2$  will be small. Roughly speaking, the larger  $X^2$  is, the more likely it is that the observed frequencies did not come from the population on which the null hypothesis is based. When  $df = 1$ , that is when  $K = 2$ , each expected frequency should be at least five. Thus, in this study the response frequency of any one word to any one response by either of the normal groups must be five or greater before the  $X^2$  test can be applied. From this analysis of response words, it was expected to derive two word lists, one each for males and females, of those responses which discriminated at the .01 level or greater.

Of the 8,960 responses made by the males, 3,859 responses were used in the application of Chi Square. This represented 44.2% of the total male responses. The females contributed 8,320 responses, of which 4,221 were used in the application of Chi Square. This represented 50.7% of the total female responses.

Using the word list derived from the  $X^2$  analysis of the male responses, the male records were rescored on the basis of this word list. The number of words appearing on any one record determined that person's score. Thus, the greater number of words appearing on any one record, the more "normal" the score. Scores could possibly range from zero to the maximum number of words on



the word list. The female records were scored on the same basis.

The second method of comparing the groups was by a method with the least assumptions and the highest power-efficiency obtainable by a nonparametric test. The Wilcoxon Matched-Pairs Signed-Ranks Test, a nonparametric test, utilizes information about the direction of the differences within pairs, as well as magnitude of difference. On the basis of the results of this study, it should be possible to tell which number of a pair is greater than the other. Also, from this study it should be possible to rank the differences in order of absolute size. Thus, a judgment of "greater than" between any pair's two performances, as well as between any two difference scores arising from any two pairs, can be made. Since the power-efficiency of the Wilcoxon Test is 95.5% of the parametric test, when the assumptions of the parametric test are in fact met, this test best fulfills the requirements for this study.

The steps below were followed in the use of the Wilcoxon Matched-Pairs Signed-Ranks Test:

1. For each matched pair, determine the signed difference ( $d_i$ ) between the two scores.
2. Rank these  $d_i$ 's without respect to sign. With tied  $d$ 's, assign the average of the tied ranks.
3. Affix to each rank the sign (+ or -) of the  $d$  which it represents.
4. Determine  $T$  = the sum of the ranks having the less frequent sign.
5. By counting, determine  $N$  = the total number of  $d$ 's having a sign.
6. The procedure for determining the significance of the observed value of  $T$  depends on the size of  $N$ .

Some  $N$  in this study will be larger than 25. Thus the formula for

the deviation value from the population mean under the null hypothesis (designated by Z) is given by the formula  $Z = \frac{T - \frac{N(N+1)}{4}}{\sqrt{\frac{N(N+1)(2N+1)}{24}}}$ . Under the null

hypothesis, the values of Z as computed by this formula are normally distributed with zero mean and unit variance. From a table of probabilities associated with values as extreme as observed value of Z in the normal distribution, the one-tailed probabilities under the null hypothesis of Z were determined.

Since the direction of the difference is predicted, i.e., the normal person of a matched pair should have the higher score, the region of rejection is one-tailed. If the difference is in the predicted direction, T, the sum of the ranks having the less frequent sign, will be the sum of the ranks of those schizophrenics whose d's are in the opposite direction from that predicted. The region of rejection consists of all Z's obtained from data with such T's which are so extreme that the probability associated with their occurrence under the null hypothesis is equal to or greater than the probability level of .01.

For purposes of comparing the effect of age and/or education on Loyola Language Study scores, Tables V and VI show the breakdown of both male and female groups into three grade levels and three age levels, making a nine cell division in all.

By the Wilcoxon Matched-Pairs Signed-Ranks Test for small samples, the effect of age or education on Loyola Language Study responses by normals and schizophrenics can be determined. The procedure is exactly the same as that described for the Wilcoxon test for large samples with one exception. Critical values for observed values of T for various sizes of  $N < 25$  are given, thus obviating the need for computing the value of Z as is indicated for large samples.

TABLE V

DISTRIBUTION OF 56 MATCHED PAIRS NORMAL AND SCHIZOPHRENIC  
MALE SUBJECTS ACCORDING TO AGE AND EDUCATION

| Age             | Grade School | High School | College | Total Ages |
|-----------------|--------------|-------------|---------|------------|
| 19-30           | 3            | 6           | 8       | 17         |
| 31-42           | 8            | 6           | 9       | 23         |
| 43-54           | 7            | 4           | 5       | 16         |
| Total<br>Grades | 18           | 16          | 22      | 56         |

TABLE VI

DISTRIBUTION OF 52 MATCHED PAIRS NORMAL AND SCHIZOPHRENIC  
FEMALE SUBJECTS ACCORDING TO AGE AND EDUCATION

| Age             | Grade School | High School | College | Total Ages |
|-----------------|--------------|-------------|---------|------------|
| 19-30           | 0            | 4           | 8       | 12         |
| 31-42           | 7            | 8           | 13      | 28         |
| 43-54           | 3            | 4           | 5       | 12         |
| Total<br>Grades | 10           | 16          | 26      | 52         |

The smallest N that will satisfy the conditions for Wilcoxon's small sample is six. Therefore, those cells with an N of less than six cannot be compared on the basis of Wilcoxon's method. However, the N is greater than six in each of the three education divisions, as well as in each of the three age divisions.

The Wilcoxon Matched-Pairs Signed-Ranks Test for small samples also

allows comparison between matched normals and schizophrenics on the basis of clinical diagnosis. Thus, such comparison should shed light on what type of schizophrenia is best discriminated by the Loyola Language Study, and also whether or not a disease entity has consistent effects in both groups.

## CHAPTER IV

### RESULTS

Tables V and VI in the previous chapter showed the distribution of this research population according to age and education, each trichotomized to form nine categories. Table VII below shows the distribution of the male research population according to disease diagnosis:

TABLE VII  
DISTRIBUTION OF 56 MALE SCHIZOPHRENIC SUBJECTS  
ACCORDING TO PSYCHIATRIC DIAGNOSIS

| Diagnosis                      | N  | Percent |
|--------------------------------|----|---------|
| Paranoid Schizophrenia         | 15 | 26.8    |
| Undifferentiated Schizophrenia | 10 | 17.8    |
| Hebephrenic Schizophrenia      | 7  | 12.5    |
| Catatonic Schizophrenia        | 6  | 10.7    |
| Mixed/Schizophrenia            | 6  | 10.7    |
| Undetermined Schizophrenia     | 5  | 9.0     |
| Simple Schizophrenia           | 7  | 12.5    |
| Total                          | 56 | 100.0%  |

The range of N extends from 15 Paranoid Schizophrenics as a maximum to an N of 5 Undetermined Schizophrenics as a minimum. These are psychiatric-

ally determined diagnoses made by staff psychiatrists at the Chicago State Mental Hospital.

Table VIII below presents the distribution of the female research population according to disease diagnosis:

TABLE VIII  
DISTRIBUTION OF 52 FEMALE SCHIZOPHRENIC SUBJECTS  
ACCORDING TO PSYCHIATRIC DIAGNOSIS

| Diagnosis                      | N  | Percent |
|--------------------------------|----|---------|
| Paranoid Schizophrenia         | 10 | 19.1    |
| Undifferentiated Schizophrenia | 12 | 23.1    |
| Hebephrenic Schizophrenia      | 7  | 13.5    |
| Catatonic Schizophrenia        | 0  | 0       |
| Mixed/Schizophrenia            | 8  | 15.4    |
| Undetermined Schizophrenia     | 8  | 15.4    |
| Simple Schizophrenia           | 7  | 13.5    |
| Total                          | 52 | 100.0%  |

In the female schizophrenic population, no records were obtained from Catatonics. Ranges in the other categories extended from 12 Undifferentiated Schizophrenics to 7 each in the Hebephrenic and Simple Schizophrenic categories.

Four distribution tables were developed, one each for Male Normal responses, Male Schizophrenic responses, Female Normal responses, and Female Schizophrenic responses. In each table, every response to every stimulus word was recorded and tabulated according to the rules discussed in the procedure.

Thus, on the basis of the frequency distribution of the responses, Male Normal-Male Schizophrenic and Female Normal-Female Schizophrenic responses could be compared on the basis of the null hypothesis. The comparison was made by the  $\chi^2$  One-Sample Test method. Only those normal responses with an N of five or greater were compared with the same responses given by their respective schizophrenic population. The region of rejection for the formula  $\chi^2 = \sum \frac{(O - E)^2}{E}$  was established at the .01 level of probability.

Table IX gives the list of stimulus-response words which had a probability of .01 or greater for the male population as determined by the  $\chi^2$  One-Sample Test method. Forty-two words, or 52.5% of the eighty stimulus words presented in the Loyola Language Study, discriminated between the normal and schizophrenic male population used in this study. Seven stimulus words (hammer, table, scissors, doctor, man, carpet, and woman) elicited two responses, each of which discriminated at the .01 level or greater.

Table X presents the list of stimulus-response words which had a probability of .01 or greater for the female population. In all, thirty stimulus words, or 37.5% of the eighty stimulus words presented in the Loyola Language Study, discriminated between the normal and schizophrenic female research population. Thus, the male and female population had 19 words common to both groups, 11 words peculiar to the female group and 23 words peculiar to the male group.

Table XI presents those stimulus words which were not common to both groups but which discriminated between each group at the .01 level or greater. It appears from these word lists that there is greater communality of thought between normals and female schizophrenics than there is between the male normals

TABLE IX

STIMULUS-RESPONSE WORDS FOR 56 MATCHED NORMAL AND SCHIZOPHRENIC  
 MALES WITH  $P > .01$  CALCULATED BY THE  $\chi^2$  ONE-SAMPLE TEST METHOD

| Stimulus Word | Response Word  | Stimulus Word | Response Word    |
|---------------|----------------|---------------|------------------|
| hungry        | food           | foot          | shoe             |
| anger         | mad            | doctor        | sick<br>sickness |
| afraid        | scared         | wish          | dream            |
| dark          | night          | sickness      | doctor           |
| red           | color          | mountain      | high             |
| joy           | happy          | stove         | hot              |
| white         | color          | girl          | female           |
| sleep         | bed            | man           | woman<br>male    |
| black         | white          | baby          | infant           |
| hammer        | nail<br>tool   | moon          | night            |
| table         | chair<br>eat   | bread         | butter           |
| thirsty       | water          | whistle       | train            |
| hard          | steel          | carpet        | soft<br>home     |
| blue          | sky            | needle        | thread           |
| sweet         | candy          | religion      | church           |
| stomach       | food           | street        | car              |
| working       | money          | bed           | sleep            |
| cold          | winter         | woman         | man<br>female    |
| whiskey       | drunk          | lion          | animal           |
| yellow        | color          | butter        | bread            |
| window        | glass          |               |                  |
| scissors      | cut<br>cutting |               |                  |



TABLE X

STIMULUS-RESPONSE WORDS FOR 52 MATCHED NORMAL AND SCHIZOPHRENIC FEMALEs WITH  $P > .01$  CALCULATED BY THE  $\chi^2$  ONE-SAMPLE TEST METHOD

| Stimulus Word | Response Word | Stimulus Word | Response Word |
|---------------|---------------|---------------|---------------|
| hungry        | food          | justice       | court         |
| dark          | night         | mountain      | height        |
| loud          | noise         | stove         | heat          |
| eating        | food          | cheese        | sandwich      |
| high          | up            | moon          | stars         |
| sleep         | bed           | spider        | insect        |
| table         | chair         | bread         | butter        |
| thirsty       | water         | whistle       | train         |
| blue          | sky           | carpet        | floor         |
| sweet         | candy         | dream         | sleep         |
| comfort       | ease          | trouble       | worry         |
| cold          | winter        | religion      | church        |
| scissors      | cut           | bed           | sleep         |
| foot          | shoe          | tobacco       | smoke         |
| house         | home          | woman         | mother        |

TABLE XI

STIMULUS WORDS WHICH DISCRIMINATED AT THE .01 LEVEL BY THE  $\chi^2$  ONE-SAMPLE TEST METHOD ON ONLY MALE OR FEMALE MATCHED LISTS

| Female  | Male     |
|---------|----------|
| loud    | anger    |
| eating  | afraid   |
| high    | red      |
| comfort | joy      |
| house   | white    |
| justice | black    |
| cheese  | hammer   |
| spider  | head     |
| dream   | stomach  |
| trouble | working  |
| tobacco | whiskey  |
|         | yellow   |
|         | window   |
|         | doctor   |
|         | wish     |
|         | sickness |
|         | girl     |
|         | man      |
|         | baby     |
|         | needle   |
|         | street   |
|         | lion     |
|         | butter   |

and male schizophrenics.

From the two word lists derived above, as shown in Tables IX and X, the 42 word "male" list was used to score all male records, and the 30 word "female" list was used to score all female records. Scoring was done by merely summing the number of response words which appeared on any one record. Thus, the greater the number of words, the more "common" or "normal" the record.

Table XII shows a summary of scores for each matched pair of male individuals with their score-difference, as well as the direction of this difference. There are 56 matched pairs in all, and these have been trichotomized into age and education categories.

Applying the Wilcoxon Matched-Pairs Signed-Ranks Test to the matched pairs of males in Table XII and using the formula  $Z = \frac{T - \frac{N(N+1)}{4}}{\sqrt{\frac{N(N+1)(2N+1)}{24}}}$  for an N of 55 (one matched pair of males had equal scores), the null hypothesis is rejected with a probability of greater than .00003. The same probability score is achieved with the female population, using the Wilcoxon Matched-Pairs Signed-Ranks Test with an N of 51. Some interesting facts can be noted on the basis of range of score differences between the male and female populations. The range of score differences for males extends from a -10 to a +24. The range of score differences for the female population extends from a -3 through a +15. Also, in the male matched pair groups, there are 11 minus scores, whereas in the female matched pair groups there are only 9. Thus, the male population had a greater number of discriminating words, a greater range of negative scores, and a greater number of negative score differences than did the female population. This would give tentative support to the findings of Noh and Guilford (47) that,

TABLE XII

SIGNED DIFFERENCE SCORES OF MATCHED PAIRS FOR 56 NORMAL AND SCHIZOPHRENIC MALES  
BASED ON THE WILCOXON MATCHED-PAIRS SIGNED-RANKS METHOD

| Grade School             |          |          |              | High School |          |          |              | College  |          |          |              |
|--------------------------|----------|----------|--------------|-------------|----------|----------|--------------|----------|----------|----------|--------------|
| Pair No.                 | Abn. Sc. | Nor. Sc. | Signed Diff. | Pair No.    | Abn. Sc. | Nor. Sc. | Signed Diff. | Pair No. | Abn. Sc. | Nor. Sc. | Signed Diff. |
| Young (Age 19-30)        |          |          |              |             |          |          |              |          |          |          |              |
| 1.                       | 7        | 17       | 10           | 19.         | 3        | 12       | 9            | 35.      | 13       | 11       | -2           |
| 2.                       | 10       | 18       | 8            | 20.         | 9        | 13       | 4            | 36.      | 10       | 12       | 2            |
| 3.                       | 11       | 21       | 10           | 21.         | 6        | 15       | 9            | 37.      | 5        | 19       | 14           |
|                          |          |          |              | 22.         | 7        | 11       | 4            | 38.      | 10       | 9        | -1           |
|                          |          |          |              | 23.         | 5        | 13       | 8            | 39.      | 10       | 15       | 5            |
|                          |          |          |              | 24.         | 10       | 9        | -1           | 40.      | 14       | 15       | 1            |
|                          |          |          |              |             |          |          |              | 41.      | 8        | 12       | 4            |
|                          |          |          |              |             |          |          |              | 42.      | 5        | 11       | 6            |
| Intermediate (Age 31-42) |          |          |              |             |          |          |              |          |          |          |              |
| 4.                       | 7        | 14       | 7            | 25.         | 1        | 7        | 6            | 43.      | 9        | 11       | 2            |
| 5.                       | 10       | 12       | 2            | 26.         | 5        | 12       | 7            | 44.      | 4        | 15       | 11           |
| 6.                       | 13       | 9        | -4           | 27.         | 12       | 8        | -4           | 45.      | 3        | 16       | 13           |
| 7.                       | 7        | 18       | 11           | 28.         | 19       | 9        | -10          | 46.      | 2        | 18       | 16           |
| 8.                       | 4        | 7        | 3            | 29.         | 5        | 15       | 10           | 47.      | 2        | 9        | 7            |
| 9.                       | 0        | 15       | 15           | 30.         | 12       | 12       | 0            | 48.      | 6        | 20       | 14           |
| 10.                      | 9        | 11       | 2            |             |          |          |              | 49.      | 7        | 15       | 8            |
| 11.                      | 7        | 13       | 6            |             |          |          |              | 50.      | 9        | 22       | 13           |
|                          |          |          |              |             |          |          |              | 51.      | 3        | 17       | 14           |
| Old (Age 43-54)          |          |          |              |             |          |          |              |          |          |          |              |
| 12.                      | 13       | 17       | 4            | 31.         | 1        | 19       | 18           | 52.      | 5        | 7        | 2            |
| 13.                      | 2        | 26       | 24           | 32.         | 13       | 12       | -1           | 53.      | 10       | 17       | 7            |
| 14.                      | 0        | 14       | 14           | 33.         | 15       | 13       | -2           | 54.      | 9        | 6        | -3           |
| 15.                      | 9        | 16       | 7            | 34.         | 7        | 16       | 9            | 55.      | 11       | 1        | -10          |
| 16.                      | 2        | 9        | 7            |             |          |          |              | 56.      | 14       | 16       | 2            |
| 17.                      | 6        | 7        | 1            |             |          |          |              |          |          |          |              |
| 18.                      | 7        | 4        | -3           |             |          |          |              |          |          |          |              |

"Men had less community of thought than women." The results of this research also lend tentative support to the work of Miles and Terman (43) in that there are sex differences revealed in responses to the word association technique.

Table XIII shows the probability scores for each of the nine categories into which the male population was divided, as well as the probability scores for each age group and each education group. The Wilcoxon Matched-Pairs

TABLE XIII

PROBABILITY OF DISCRIMINATION IN EACH MATCHED MALE CATEGORY AS COMPUTED BY THE WILCOXON MATCHED-PAIRS SIGNED-RANKS METHOD

| Age                         | Grade School       |    | High School        |    | College            |    | Total    |     |
|-----------------------------|--------------------|----|--------------------|----|--------------------|----|----------|-----|
|                             | P                  | N  | P                  | N  | P                  | N  | P        | N   |
| Young<br>(Age 19-30)        | Indeter-<br>minate | 6  | .025               | 12 | < .025             | 16 | > .005   | 34  |
| Intermediate<br>(Age 31-42) | .025               | 16 | Indeter-<br>minate | 12 | > .001             | 18 | > .005   | 46  |
| Old<br>(Age 43-54)          | .025               | 14 | Indeter-<br>minate | 8  | Indeter-<br>minate | 10 | < .025   | 32  |
| Total                       | > .005             | 36 | < .025             | 32 | > .005             | 40 | > .00003 | 112 |

Signed-Ranks Test was again used to obtain the probability scores of any group or category with an N of six or greater. Only one category, the College-Intermediate age category, produced a probability score of greater than .01. However, considering each grade level, irrespective of age, the Grade School group and the College group both had P greater than .01. The High School group, however, produced a probability score of less than .01. Thus, there does not seem to be any

direct relationship between education and discriminability based on the Loyola Language Study.

This finding for the male population does not agree with Stanek's finding of direct proportion between communality of response and education. Considering age levels, irrespective of grades, the results of this study agree with Stanek's (62) results in that there is an inverse relationship between age and communality of response. The Young and Intermediate groups have probability scores of .005, whereas the Old group has a probability score of less than .025.

An analysis of the Old group by combining any two consecutive Old categories shows an interesting trend. By combining the Old-Grade and Old-High School categories, a probability score greater than .005 is obtained. However, by combining the Old-High School and Old-College categories, a probability score of less than .025 is obtained. In the Old group, at least, the greater amount of education seems to make the Loyola Language Study less effective in distinguishing between schizophrenics and normals. In the Old-College category, a matched pair produced the highest negative score, -10; whereas, in the Old-Grade category, a matched pair produced the highest positive score, a +24. Thus, in the Old group, the highest and lowest scores were produced. Also, the Old group contained 50% of the negative scores, and only 29% of the experimental population.

Table XIV shows the probability scores of male matched pairs grouped by diagnosis. Only two disease categories, Undifferentiated Schizophrenia and Mixed/Undetermined Schizophrenia, differentiated between the normals and schizophrenics at the .01 level. The four classical schizophrenic diagnoses, Paranoid, Hebephrenia, Catatonia, and Simple, were not significantly different at

the .01 level. Although the relatively few N's in each category mitigate the significance of the findings in Table XIV for any reliable conclusions, at least a basis for future comparison with other group studies is established for confirmation or denial.

TABLE XIV

PROBABILITY SCORES AS COMPUTED BY THE WILCOXON MATCHED-PAIRS SIGNED-RANKS METHOD ON 56 MATCHED PAIRS OF NORMAL AND SCHIZOPHRENIC MALES GROUPED ACCORDING TO PSYCHIATRIC DIAGNOSIS

| N  | Diagnosis          | P               |
|----|--------------------|-----------------|
| 15 | Paranoid           | < .025          |
| 10 | Undifferentiated   | > .005          |
| 7  | Hebephrenic        | > .025<br>< .01 |
| 6  | Catatonic          | < .025          |
| 11 | Mixed/Undetermined | > .005          |
| 6  | Simple             | < .025          |

In summarizing the results of comparing matched male normals and male schizophrenics, several factors are pointed up. First, taken as a group, the Loyola Language Study does discriminate between normal males and schizophrenic males. However, the discriminatory power of the Loyola Language Study varies consistently with age and inconsistently with education. With respect to age, the age category of 43-54 lends itself least to discrimination on the basis of communality of languages. With respect to education, males in the High School category are less distinguishable on the basis of communality of thought than are the males in the Grade School and College categories. In comparing commun-

ality of thought on the basis of disease diagnosis, the classical types of schizophrenia are not discriminated at the .01 level. However, with this study, the "mixed" or "contaminated" types of schizophrenia are distinguishable on the basis of the Loyola Language Study at the .01 level.

In Table XV the matched pairs female population is presented. There are 52 matched pairs in all, and these have been trichotomized into age and education categories in the same manner as the male matched pairs population. This table shows that there are nine negative scores, 42 positive scores, and one tied score. Using the Wilcoxon Matched-Pairs Signed-Ranks Test, an analysis of the signed-rank scores for the total female research population yields a probability score of greater than .00003.

Table XVI presents the probability score of each female category, when determinable, and also the probability score for each age and education group.

TABLE XVI

PROBABILITY OF DISCRIMINATION IN EACH MATCHED FEMALE CATEGORY AS COMPUTED BY THE WILCOXON MATCHED-PAIRS SIGNED-RANKS METHOD

| Age                         | Grade School       |    | High School        |    | College            |    | Total           |     |
|-----------------------------|--------------------|----|--------------------|----|--------------------|----|-----------------|-----|
|                             | P                  | N  | P                  | N  | P                  | N  | P               | N   |
| Young<br>(Age 19-30)        | Indeter-<br>minate | 0  | Indeter-<br>minate | 8  | < .025             | 16 | > .005<br>< .01 | 24  |
| Intermediate<br>(Age 31-42) | > .025<br>< .01    | 14 | > .01              | 16 | > .005             | 26 | > .005          | 56  |
| Old<br>(Age 43-54)          | Indeter-<br>minate | 6  | Indeter-<br>minate | 8  | Indeter-<br>minate | 10 | > .005          | 24  |
| Total                       | > .005             | 20 | > .005             | 32 | > .005             | 52 | > .00003        | 104 |



TABLE XV

SIGNED DIFFERENCE SCORES OF MATCHED PAIRS FOR 52 NORMAL AND SCHIZOPHRENIC FEMALES BASED ON THE WILCOXON MATCHED-PAIRS SIGNED-RANKS METHOD

| Grade School             |          |          |              | High School |          |          |              | College  |          |          |              |
|--------------------------|----------|----------|--------------|-------------|----------|----------|--------------|----------|----------|----------|--------------|
| Pair No.                 | Abn. Sc. | Nor. Sc. | Signed Diff. | Pair No.    | Abn. Sc. | Nor. Sc. | Signed Diff. | Pair No. | Abn. Sc. | Nor. Sc. | Signed Diff. |
| Young (Age 19-30)        |          |          |              |             |          |          |              |          |          |          |              |
|                          |          |          |              | 11.         | 4        | 9        | 5            | 27.      | 4        | 11       | 7            |
|                          |          |          |              | 12.         | 7        | 14       | 7            | 28.      | 4        | 1        | -3           |
|                          |          |          |              | 13.         | 6        | 5        | -1           | 29.      | 6        | 17       | 11           |
|                          |          |          |              | 14.         | 0        | 12       | 12           | 30.      | 13       | 12       | -1           |
|                          |          |          |              |             |          |          |              | 31.      | 0        | 6        | 6            |
|                          |          |          |              |             |          |          |              | 32.      | 6        | 8        | 2            |
|                          |          |          |              |             |          |          |              | 33.      | 7        | 13       | 6            |
|                          |          |          |              |             |          |          |              | 34.      | 10       | 7        | -3           |
| Intermediate (Age 31-42) |          |          |              |             |          |          |              |          |          |          |              |
| 1.                       | 6        | 10       | 4            | 15.         | 1        | 13       | 12           | 35.      | 9        | 15       | 6            |
| 2.                       | 6        | 11       | 5            | 16.         | 1        | 12       | 11           | 36.      | 3        | 15       | 12           |
| 3.                       | 6        | 12       | 6            | 17.         | 5        | 14       | 9            | 37.      | 4        | 8        | 4            |
| 4.                       | 5        | 15       | 10           | 18.         | 5        | 4        | -1           | 38.      | 2        | 6        | 4            |
| 5.                       | 1        | 13       | 12           | 19.         | 5        | 8        | 3            | 39.      | 2        | 17       | 15           |
| 6.                       | 11       | 10       | -1           | 20.         | 6        | 9        | 3            | 40.      | 1        | 7        | 6            |
| 7.                       | 7        | 10       | 3            | 21.         | 7        | 15       | 8            | 41.      | 2        | 12       | 10           |
|                          |          |          |              | 22.         | 3        | 13       | 10           | 42.      | 5        | 15       | 10           |
|                          |          |          |              |             |          |          |              | 43.      | 3        | 2        | -1           |
|                          |          |          |              |             |          |          |              | 44.      | 6        | 13       | 7            |
|                          |          |          |              |             |          |          |              | 45.      | 2        | 12       | 10           |
|                          |          |          |              |             |          |          |              | 46.      | 3        | 14       | 11           |
|                          |          |          |              |             |          |          |              | 47.      | 13       | 13       | 0            |
| Old (Age 43-54)          |          |          |              |             |          |          |              |          |          |          |              |
| 8.                       | 2        | 10       | 8            | 23.         | 2        | 14       | 12           | 48.      | 9        | 16       | 7            |
| 9.                       | 2        | 10       | 8            | 24.         | 5        | 4        | -1           | 49.      | 4        | 10       | 6            |
| 10.                      | 5        | 11       | 6            | 25.         | 10       | 9        | -1           | 50.      | 1        | 13       | 12           |
|                          |          |          |              | 26.         | 3        | 18       | 15           | 51.      | 8        | 13       | 5            |
|                          |          |          |              |             |          |          |              | 52.      | 5        | 11       | 6            |

Education does not affect the discriminatory power of the Loyola Language Study since the probability score in each group is greater than .005. This result is at variance with the results of education and Loyola Language Study results with the male population. Also, the effect of age on Loyola Language Study results is reversed in effect with females in comparison to the results obtained with the male population. With the female groups, the Loyola Language Study discriminates best with the Intermediate and Old age groups, with a probability score greater than .01. With the Young female group the probability score is less than .01 although it is greater than the .025 level. Thus, for the female population, it appears that, as measured by the Loyola Language Study, communality of thought is unaffected by education but appears to have a direct correlation with age. An increase in age apparently increases communality of thought irrespective of education. This is in contrast to the results found with the male population in that education appears to have an effect on communality of thought and age tends to decrease communality of thought rather than increase. These results would tend to show that the thought processes in schizophrenics are not the same for each sex.

Table XVII shows the probability scores of female matched pairs grouped by diagnosis. Normals, paired with Hebephrenics and Simple Schizophrenics, yield probability scores of less than .01. The Undifferentiated, Paranoid, and Mixed/Undetermined Schizophrenic groups are discriminated at the .01 level or greater. On the basis of disease alone, the Loyola Language Study discriminates between types of schizophrenics among females much more effectively than it does among males. Both male and female schizophrenics diagnosed as Undifferentiated or Mixed/Undetermined are discriminated at the .01 level or

TABLE XVII

PROBABILITY SCORES AS COMPUTED BY THE WILCOXON MATCHED-PAIRS SIGNED-RANKS METHOD ON 52 MATCHED PAIRS OF NORMAL AND SCHIZOPHRENIC FEMALES GROUPED ACCORDING TO PSYCHIATRIC DIAGNOSIS

| N  | Diagnosis          | P              |
|----|--------------------|----------------|
| 10 | Paranoid           | >.005          |
| 12 | Undifferentiated   | > .005         |
| 7  | Hebephrenic        | >.025<br><.01  |
| 14 | Mixed/Undetermined | > .005         |
| 7  | Simple             | > .025<br><.01 |

greater. Female Paranooids are discriminated at the .005 level, whereas male Paranooids are discriminated at a probability level less than .025. In terms of actual numbers, 21 males or 37.6% of the total schizophrenic male group were discriminated at the .01 level or greater, whereas 36 females or 69.2% of the total schizophrenic group were discriminated at the .01 level. This finding again confirms the work of Noh and Guilford (47) that men had less communality of thought than women, and therefore, would render the Loyola Language Study more effective in discriminating differences among females than among males.

The practical uses to which a test may be applied are directly proportional to the degree with which the instrument validly and reliably performs the task assigned it. In this research study, the practical question to be answered is, "Can a particular score on the Loyola Language Study distinguish between a schizophrenic and a normal person?" The answer is a tentative "yes."

The Wilcoxon Matched-Pairs Signed-Ranks Test does reject the null hypothesis with a probability of greater than .01 when the matched groups are compared.

Table XVIII shows score distributions for the four categories, Male Normals, Male Schizophrenics, Female Normals, and Female Schizophrenics. There is an overlapping of scores between Male Normals-Male Schizophrenics and Female Normals-Female Schizophrenics. This overlapping is shown by the coefficient of variation within the abnormal groups and the normal groups. The male normal variation is 64% of the schizophrenic variation, and the normal female population has a 52% variation in scores when compared with the female schizophrenic population. Thus a cutoff score of 12 on a male record would include 82% of the schizophrenic population, but would also include 34% of the normal population. A cutoff score of 9 would include 86% of the normal males, but would also include 39% of the schizophrenic male population. The best that can be said at present is that any male score above 15 (out of a possible score of 42) is very likely, one in one hundred, to be the score of a normal person. Scores between 12 and 15 have a 16% possibility to be that of a schizophrenic. A score of four or less would very likely, one in one hundred, be that of a schizophrenic. A cutoff point of three in the female population would include below that score only 4% of the normal scores and 37% of the schizophrenic scores. A cutoff point of 12 would include only 4% of the female schizophrenic population and 40% of the normal population. Table XIX establishes tentative diagnostic norms for male and female scores.

In summarizing the results, the works of some writers are supported to some degree by this study, but the work of others is not substantiated. Mention has already been made of the effect of sex, age, and education on the

TABLE XVIII

SCORE DISTRIBUTIONS ON THE LOYOLA LANGUAGE STUDY FOR EACH OF TWO MATCHED  
POPULATIONS CONSISTING OF 56 NORMAL MALES, 56 SCHIZOPHRENIC MALES,  
52 NORMAL FEMALES, AND 52 SCHIZOPHRENIC FEMALES

| Scores                 | Male<br>Normals | Male<br>Schizophrenics | Female<br>Normals | Female<br>Schizophrenics |
|------------------------|-----------------|------------------------|-------------------|--------------------------|
| 26                     | 1               |                        |                   |                          |
| 22                     | 1               |                        |                   |                          |
| 21                     | 1               |                        |                   |                          |
| 20                     | 2               |                        |                   |                          |
| 19                     | 2               | 1                      |                   |                          |
| 18                     | 3               |                        | 1                 |                          |
| 17                     | 4               |                        | 2                 |                          |
| 16                     | 4               |                        | 1                 |                          |
| 15                     | 7               |                        | 5                 |                          |
| 14                     | 2               | 1                      | 4                 |                          |
| 13                     | 4               | 5                      | 8                 | 2                        |
| 12                     | 6               | 2                      | 6                 | 0                        |
| 11                     | 5               | 2                      | 4                 | 1                        |
| 10                     | 0               | 7                      | 6                 | 3                        |
| 9                      | 6               | 3                      | 3                 | 2                        |
| 8                      | 1               | 3                      | 3                 | 0                        |
| 7                      | 4               | 8                      | 2                 | 4                        |
| 6                      | 1               | 4                      | 3                 | 8                        |
| 5                      | 0               | 6                      | 1                 | 8                        |
| 4                      | 1               | 2                      | 1                 | 5                        |
| 3                      | 0               | 3                      | 0                 | 5                        |
| 2                      | 0               | 4                      | 1                 | 7                        |
| 1                      | 1               | 2                      | 1                 | 5                        |
| 0                      | 0               | 2                      | 0                 | 2                        |
| N =                    | 56              | 56                     | 52                | 52                       |
| M =                    | 13.52           | 7.45                   | 11.04             | 4.90                     |
| SD =                   | 4.73            | 4.08                   | 3.70              | 3.17                     |
| Coeff.<br>of<br>Var. = | 35.0            | 54.6                   | 33.50             | 64.80                    |
|                        |                 | 94                     |                   |                          |

TABLE XIX

SCORES AND TENTATIVE DIAGNOSTIC INFERENCES FOR  
THE LOYOLA LANGUAGE STUDY IN SCHIZOPHRENIA

| Scores  | Inference          |                    | Probability |        |
|---------|--------------------|--------------------|-------------|--------|
|         | Male               | Female             | Male        | Female |
| 0 - 4   | Probable Schizo.   | Probable Schizo.   | >.01        | >.05   |
| 5 - 12  | None               | None               | Insig.      | Insig. |
| 13 - 15 | Probably Normal    | Likely Normal      | .14         | >.01   |
| 16 - Up | Very Likely Normal | Very Likely Normal | >.01        | >.01   |

results of the Loyola Language Study. Although a different scoring method is used, our results lend support to those obtained by Snider (61) in his study comparing normal females and schizophrenic females taken from a Boston sampling. This would tend to negate the factor of geographical influences on the test. Specifically, the Loyola Language Study seems to effectively discriminate between a matched population irrespective of geographical setting.

Kent and Rosanoff were the first to indicate experimentally the notion that normal people give more common responses than abnormal. Furthermore, they contended that there is no sharp differentiation between normality and non-normality in responses to the word association technique, but that there appears to be a continuous process from one state to the other. The findings of this writer's present research lend support to Kent and Rosanoff's findings in both the notion of commonality and continuous states.

Although some writers emphasize various qualitative factors or "signs" in pointing up diagnostic possibilities with the word association technique,

nothing in this research would lend support to this hypothesis. Needless to say, if a person uses neologisms, word salads, confabulations, or the like, that person is immediately suspected of some mental aberration. In this study, having used only those patient-subjects who were "supporting" themselves, thus indicating some measure of institutionalized stability, very few "signs" appeared on the test records. Thus, "normal-like" records were produced whereby the form was the same as the form of normal records, but the content (or response) held the key to the differences in records. Thus, this research points up results which are not "obvious" and opens up further possibilities in increasing the discriminatory effectiveness of the Loyola Language Study.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

A recent modification of the word association technique by Snider and Johnson (59) gave rise to the Loyola Language Study, a semi-controlled type of association test which measures communality of thought. The Loyola Language Study incorporates in its technique a demand of the subject which calls upon greater ego-control factors than do either the free association technique or the rigidly controlled association method. This fact gave rise to the question of whether or not such a demand would elicit responses from a matched group of normals and schizophrenics which would discriminate between the two groups. Thus, the design of this experiment was formulated to investigate the discriminatory power of the Loyola Language Study in schizophrenia. A secondary purpose of this study involved investigating the effect of age, education, and sex on the discriminatory power of the Loyola Language Study.

The previous literature on word association techniques and their application to the study of mental abnormality is clearly dichotomized. The free association technique was used almost exclusively from approximately 1880 until 1950. From the mid-thirties up to the present time, various forms of controlled association tests have been developed for research purposes. None of the techniques in their various modifications has proved reliably effective either as a diagnostic instrument or as a screening device. However, the seven decades of research have pointed up these facts. Normals give more common responses and



less idiosyncratic responses than do insane individuals. Normal women give more common responses than do normal men. Education and common responses are positively correlated, while age and common responses are negatively correlated. Finally, most studies, with either the free or controlled method, indicate a gradual transition in commonness of responses from the normal to the insane state.

The procedure in this study consisted of matching a normal and hospitalized population as to sex, age, and education. The research sample included 56 male normals, 56 male schizophrenics, 52 female normals, and 52 female schizophrenics. The 17,280 responses from the Loyola Language Study were tabulated and analyzed by the Chi-square One-Sample Test method and the Wilcoxon Matched-Pairs Signed-Ranks method for significant differences. These nonparametric techniques were used because of their suitability to the measurement requirements of the research design.

The results of the statistical analysis revealed that the Loyola Language Study does discriminate between normal and schizophrenic matched groups. Since this finding was positive, analyses on the basis of sex, age, education, and diagnosis were made. The Wilcoxon Matched-Pairs Signed-Ranks method was also used in making these analyses.

The following conclusions were based on the statistical analysis of the results for the sample population of 216 matched subjects. Because of the small sample, these conclusions should be considered as being peculiar to this research sample only. Furthermore, these conclusions may profitably be compared with conclusions of other studies using a similarly matched population, thereby confirming or contradicting the present findings.

1. The Loyola Language Study does discriminate between normal and schizophrenic populations, both male and female.
2. Male populations -- both normal and schizophrenic -- have less communality of response than do female normal and female schizophrenic populations, respectively.
3. There is no consistent relationship between education and the discriminatory power of the Loyola Language Study in male schizophrenics.
4. With males, an increase in age decreases the discriminatory power of the Loyola Language Study. College men between the ages of 43 and 54 are least discriminated in terms of age.
5. With females, an increase in age increases discrimination between normals and schizophrenics. The age group between 19 and 30 is least discriminated.
6. Education does not affect the discriminatory power of the Loyola Language Study with females.
7. Based only on a very small sample in each diagnostic category and using the Wilcoxon Matched-Pairs Signed-Ranks scoring method, the Paranoics, Catatonics, Hebephrenics, and Simple Schizophrenics are less discriminated in the male group than are the "nonclassical" diagnosed schizophrenics, such as Mixed, Undifferentiated, and Undetermined. A different scoring technique, or a different sample may produce results other than those obtained in this study. Nevertheless, this conclusion forms a basis for comparison with other results which might be obtained in other studies.
8. In the female population, Paranoics, Undifferentiated, and Mixed/Undetermined Schizophrenics are best discriminated, whereas Hebephrenic and

Simple Schizophrenics are least discriminated. Again, this conclusion is based only on a very small sample in each diagnostic category, and therefore allows for no generalization to other samples.

9. Tentative diagnostic scores are established. The small sampling population makes these scores very tentative at best, and does not allow for generalizations to other populations.

10. Geographical, ethnical, and vocational variables should be isolated and studied as further refinements to the Loyola Language Study.

11. It seems possible that with scoring refinements, the Loyola Language Study in and of itself may become a single screening test of high validity and reliability.

12. Changes in the schizophrenic process within an individual can be periodically measured for changes with the Loyola Language Study.

13. Further research with the Loyola Language Study and other disease entities is indicated in the light of the results of the present study.

## BIBLIOGRAPHY

### I. PRIMARY SOURCES

#### A. BOOKS

1. Arieti, Silvano. Interpretation of Schizophrenia. New York: Brunner Publication, 1955.
2. Bell, John E. Projective Techniques. New York: Longmans, Green, and Co., 1949.
3. Bleuler, Eugen. Dementia Praecox or the Group of Schizophrenias. Translated by Joseph Zinkin. New York: Universities Press, 1952.
4. Galton, Francis F. R. S. Inquiries into Human Faculties and Its Development. New York: MacMillan and Co., 1883.
5. Humphrey, George. Thinking. New York: John Wiley and Sons, 1951.
6. Hunt, J. McV. Personality and the Behavior Disorders. Vol. II, Chapter 32, "Psychological Deficit." New York: The Ronald Press Co., 1944. Pp. 999-1001.
7. Jung, Carl G. Collected Papers on Analytical Psychology. "A Contribution to the Study of Psychological Types." London: Bailliere, Tindall, and Cox, 1920.
8. Jung, Carl G. The Psychology of Dementia Praecox. Nervous and Mental Disease Monograph Series. New York, n. 3, 1936.
9. Jung, Carl G. Studies in Word Association. Translated by M. D. Eder. London: Heinemann, 1918.
10. Kraepelin, Emil. Dementia Praecox and Paraphrenia. From 8th German Edition. Edinburgh: Livingston, 1925.
11. Lief, A. The Commonsense Psychiatry of Dr. Adolf Meyer. Fifty-Two Selected Papers. New York: McGraw-Hill, 1948.
12. McNemar, Quinn. Psychological Statistics. New York: John Wiley and Sons, 1949.

13. Rapaport, D., Gill, M., and Schafer, R. Diagnostic Psychological Testing. Vol. II. Chicago: The Yearbook Publishers, Inc., 1946. Pp. 13-84.
14. Rosanoff, A. J. Manual of Psychiatry. Revised Ed. New York: John Wiley and Sons, 1948.
15. Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill, 1956.
16. Weider, Arthur; Mittleman, Bela; Brodman, K.; Wechsler, David; and Wolff, H. G. Cornell Word Form Manual. New York, 1941.

#### B. ARTICLES

17. Baker, L. M., and Elliott, D. N. "Controlled and Free Association Times with Identical Stimulus and Response-Words," The American Journal of Psychology, 61, 1948, 535-539.
18. Balken, Eva Ruth. "A Delineation of Schizophrenic Language and Thought in a Test of Imagination," The Journal of Psychology, 16, 1943, 239-271.
19. Bousfield, W. A. "The Relationship Between Mood and the Production of Affectively Toned Associates," The Journal of General Psychology, 42, 1950, 67-85.
20. Bruner, Jerome S., and Postman, Leo. "Emotional Selectivity in Perception and Reaction," Journal of Personality, 16, 1947, 69-77.
21. Carlson, V. R. "Individual Differences in the Recall of Word Association Test Words," Journal of Personality, 23, 1954, 77-87.
22. Ghodoroff, Bernard, and Mussen, Paul. "Qualitative Aspects of the Vocabulary Responses of Normals and Schizophrenics," Journal of Consulting Psychology, 16, 1952, 43-48.
23. Crown, Sidney. "A Controlled Association Test as a Measure of Neuroticism," Journal of Personality, 16, 1947, 198-208.
24. Crown, Sidney. "The Word Connexion List as a Diagnostic Test: Norms and Validation," British Journal of Psychology, General Section 43, May 1952, 103-109.
25. Ericksen, Charles W., and Lazarus, R. S. "Perceptual Defense and Projective Tests," Journal of Abnormal and Social Psychology, 47, 1952, 302-308.
26. Ericksen, Charles W. "Defense Against Ego Threat in Memory and Perception," Journal of Abnormal and Social Psychology, 47, 1952, 230-235.

27. Eysenck, H. J. "Abnormal Preference Judgments as 'Complex' Indicators." American Journal of Orthopsychiatry, 12, 1942, 338-345.
28. Graham, Virginia T. "Psychological Studies of Hypoglycemia Therapy," Journal of Psychology, 10, 1940, 327-358.
29. Haigh, Gerard V., and Fiske, Donald W. "Corroboration of Personal Values as Selective Factors in Perception," Journal of Abnormal and Social Psychology, 47, 1952, 394-398.
30. Hull, Clark L., and Lugoff, L. S. "Complex Signs in Diagnostic Free Association," Journal of Experimental Psychology, 4, 1921, 111-136.
31. Janis, Irving L. "Psychologic Effects of Electric Convulsive Treatments: II. Changes in Word Association Reactions," Journal of Nervous and Mental Disease, 3, 1950, 383-397.
32. Jung, Carl G. "The Association Method," American Journal of Psychology, 21, 1910, 219-269.
33. Kent, Grace H., and Rosanoff, A. J. "A Study of Association in Insanity," American Journal of Insanity, 57, 1910, 1-142.
34. Kline, Milton V., and Schneck, Jerome M. "Hypnosis in Relation to the Word Association Test," Journal of General Psychology, 44, 1951, 129-137.
35. Kohs, Samuel C. "The Association Method in Its Relationship to the Complex and Complex Indicators," American Journal of Psychology, 5, 1914, 544-594.
36. Laffal, Julius. "The Learning and Retention of Words with Association Disturbances," Journal of Abnormal and Social Psychology, 47, 1952, 454-462.
37. Laffal, Julius. "Response Faults in Word Association as a Function of Response Entropy," Journal of Abnormal and Social Psychology, 50, 1952, 265-270.
38. McGinnies, Elliott. "Personal Values as Determinants of Word Association," Journal of Abnormal and Social Psychology, 45, 1950, 28-36.
39. Malamud, Daniel L. "Value of the Maller Controlled Association Test as a Screening Device," Journal of Psychology, 21, 1946, 37-44.
40. Maller, J. B. "Controlled Association Test," New York: Bureau of Publication, Teachers College, Columbia University, 1934.
41. Martin, Anne. "A Study of Types of Word Association in Dementia Praecox and Manic-Depressives," Journal of General Psychology, 33, 1945, 257-264.

42. Meadow, Arnold; Greenblatt, Milton; and Solomon, Harry C. "Looseness of Association and Impairment in Abstraction in Schizophrenia," Journal of Nervous and Mental Disease, 118, July-Dec. 1953, 327-334.
43. Miles, Catherine C., and Terman, Lewis, M. "Sex Differences in the Association of Ideas," American Journal of Psychology, 41, No. 2, 1929, 165-206.
44. Moran, Louis J. "Vocabulary Knowledge and Usage Among Normal and Schizophrenic Subjects," Psychological Monographs: General and Applied, 67, 1953, 1-19.
45. Moran, L. J., Moran, F. A., and Blake, R. R. "An Investigation of the Vocabulary Performance of Schizophrenics, III. Qualitative Analysis of Definitions," Journal of Genetic Psychology, 80, 1952, 141-150.
46. Murphy, Gardner. "Types of Association in Dementia Praecox, Manic Depressives, and Normal Persons," American Journal of Psychiatry, 11, 1923, 539-570.
47. Noh, Elinor J., and Guilford, J. P. "Sex Differences and the Method of Continuous Lists," American Journal of Psychology, 43, No. 3, 1930, 415-419.
48. Saslow, George, and Shoebe, F. O. "Evaluation of a Psychiatric Screening Test. Cornell Word Form - 1," American Journal of Psychiatry, 106, 1949, 37-45.
49. Schafer, Roy. "Clinical Evaluation of a Word Association Test," Bulletin of the Menninger Clinic, 9, 1945, 84-88.
50. Schafer, Roy. "A Study of Thought Processes in a Word Association Test," Character and Personality, 13, 1945, 212-257.
51. Schneek, George F., Shakow, David, and Lively, Mary L. "Studies in Insulin and Metrozol Therapy: I. The Differential Prognostic Value of Some Psychological Tests," Journal of Personality, 14, 1945, 106-124.
52. Secord, Paul F. "Objectification of Word Association Procedures by the Use of Homonyms: A Measure of Body Cathexis," Journal of Personality, 21, 1953, 477-495.
53. Sullivan, H. S. "Schizophrenia: Its Conservative and Malignant Features," American Journal of Psychiatry, 4, 1924, 50-77.
54. Tendler, Alexander D. "Significant Features of Disturbance in Free Association," Journal of Psychology, 20, 1945, 65-89.
55. Whiteman, Martin. "The Performance of Schizophrenics on Social Concepts," Journal of Abnormal and Social Psychology, 49, 1954, 266-271.

56. Wyatt, H. G. "Free Word Association and Sex Differences," American Journal of Psychology, 44, No. 3, 1932, 454-472.

### C. UNPUBLISHED MATERIALS

57. Keene, Charles Mansel. "Commonality of Response on a Word-Association Test: A Study of Standardization Procedures and an Attempt to Forecast Moderate Emotional Maladjustment." Stanford University -- Abstracts of Dissertation, 1950-1951.
58. Smola, Gerard F., S. J. "Norms for High School Seniors in the Loyola Language Study," Unpublished M. A. Thesis, Loyola University, Chicago, Illinois, 1955.
59. Snider, Louis B., S. J. "Progress Report on the Loyola Language Study." Unpublished Report. Loyola University, Chicago, 1954.
60. Snider, Louis B., S. J. "Loyola Language Study." Unpublished Report. Loyola University, Chicago, 1954.
61. Snider, Louis B., S. J. "An Experimental Approach to Diagnosis." A Report Given at the Fall Meeting of the Chicago Society of Catholic Psychologists, Chicago, 1954.
62. Stanek, Richard. "An Investigation of the Influence of Age, Sex, and Education on Responses to a Semi-Controlled Association Test." Unpublished Doctoral Dissertation. Loyola University, Chicago, 1956.

## II. SECONDARY SOURCES

### A. BOOKS

63. Garrett, Henry E. Statistics in Psychology and Education. 3rd Edition. New York: Longmans, Green, and Co., 1947.



## Loyola Language Study Test Booklet

REVISED

## LOYOLA LANGUAGE STUDY

**Instructions**

WHEN PEOPLE see or hear a word, they often think of another word. If you say the word *stem*, most people would think of *flower*. Some, but not the greatest number, might think of *pipe*, *grass*, *stop*, and so forth.

This study wants to find out what word you think the *greatest number of people* would be most likely to think of when they see or hear each of the words on the next two pages.

Please write next to each of the words the *one word* which you think the *greatest number of people* would be most likely to think of when they see or hear the word in the list. Take as much time as you need to think about the word which seems to you to "go along" with each printed word. Then choose the *one word* which you think the *greatest number of people* would be most likely to think of when they see or hear the given word. Write the *one word* which you choose beside the printed word. Do not skip any word.

Remember, you are not asked to write down just any word that comes to your mind. You should write down the *one word* which you think the *greatest number of people* would be most likely to think of.

**Important:** please fill out the information blank on page 4.

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# APPENDIX I

## Loyola Language Study Test Booklet

3

whiskey

yellow

window

scissors

foot

doctor

wish

house

justice

river

sickness

mountain

stove

girl

salt

man

cheese

baby

moon

spider

bread

whistle

carpet

needle

hand

thief

dream

trouble

religion

street

health

ocean

bed

child

tobacco

woman

cabbage

citizen

earth

lion

butter

music

Turn to page 4

Beside each of the words printed below write the *one word* which you think the *greatest number of people* would be most likely to think of when they see or hear that word.

|           |           |
|-----------|-----------|
| soldier   | sour      |
| hungry    | king      |
| butterfly | deep      |
| long      | sleep     |
| head      | black     |
| anger     | hammer    |
| afraid    | table     |
| fruit     | thirsty   |
| dark      | quiet     |
| red       | hard      |
| loud      | blue      |
| bath      | sweet     |
| eating    | stomach   |
| joy       | working   |
| rough     | comfort   |
| heavy     | soft      |
| high      | short     |
| white     | beautiful |
| command   | cold      |

whis  
yello  
win  
sciss  
foot  
doct  
wish  
hou  
just  
rive  
sick  
mov  
stov  
girl  
salt  
mar  
che  
bab  
mo  
spie  
bre

APPROVAL SHEET

The dissertation submitted by Anthony James Del Vecchio has been read and approved by five members of the Department of Psychology.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the dissertation is now given final approval with reference to content, form, and mechanical accuracy.

The dissertation is therefore accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

May 15, 1957  
Date

Frank Kobler  
Signature of Adviser