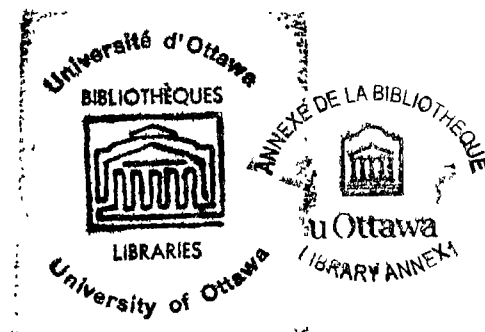


OVERINCLUSION AND DIVERGENT THINKING
IN SCHIZOPHRENIA

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CURRICULUM STUDIORUM

A. Eugene Palchanis was born on October 8, 1936, in Shavertown, Pennsylvania. He received the Bachelor of Science degree in Psychology from the University of Scranton in 1959, and the Master of Arts degree in Psychology from the University of Ottawa in 1962. The title of his thesis was The Effect of Stimulant Drugs on the Negative After-Image Threshold.

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INTRODUCTION

In attempting to understand schizophrenia one is rather consistently faced with the fact that individuals who are so classified demonstrate psychological deficits in almost every aspect of behavior which has been investigated. Rarely is it reported that schizophrenic individuals have tangible psychological assets. While this is undoubtedly the reality in many instances, it is also possible that this is a function of theoretical perspective. One aspect of schizophrenia which has received what seems to be an incredible concentration of scientific effort has been thought disorder, frequently inferred with reference to a restricted model of intellectual functioning which may obscure some psychological assets in the realm of intellect.

Interference Theory, formulated in the light of the contemporary model of intelligence, proposes an explanation for deficits in conventional thinking skills in terms of the phenomenon of overinclusion. Within the perspective of this theory, overinclusion is considered a cognitive liability because of its disruptive influence upon cognitive operations leading to atypical or deviant thinking. This so-called deviant thinking has sometimes been called creative thinking because of departure from the usual.

The present study was undertaken to investigate directly the possible association between overinclusion and

creative thinking in schizophrenia, within the framework of Guilford's Structure-of-Intellect model, rather than with reference to the more traditional construct of verbal intelligence. Certain divergent-thinking abilities of this model were the aspects of creative thinking studied. The following pages are a report of the research project which was executed.

The report itself is divided into three chapters, treating respectively the pertinent theoretical background, the experimental design and the results of the experiment. Within each chapter various subdivisions have been made as was necessary. The summary and conclusions present the implications of the findings and suggestions for further research.

CHAPTER 1

REVIEW OF THE LITERATURE

The purpose of this chapter is to reach an explicit statement of the problem under investigation. Such an objective is contingent upon elaboration and definition of the variables of the study. Hopefully, a perspective and an understanding of the problem will be established by presenting theoretical considerations and related experimentation. In order to attain and maintain an acceptable orderliness the discourse itself will be divided into sections. Sections One and Two will present, respectively, the theoretical foundation of the research, namely, Interference Theory, and a discussion of divergent thinking. Section Three is intended to be a summary and synthesis, finally in the form of hypothetical statements amenable to experimental verification.

1. Interference Theory.

Aberrations of concept formation or concept attainment have received much scientific attention and investigation. Even a casual perusal of the literature testifies that thought disorder, particularly that encountered in schizophrenia, has provided numerous opportunities to theorize and experiment in an attempt to understand the nature and mechanisms of these aberrations. One emergent theory offering some possible

explanations has come to be known as Interference Theory. Integral to the formulation of this theory is the phenomenon of overinclusion which can be traced experimentally and historically to Norman Cameron.

Initially, Cameron was interested in clarifying thinking differences between senile psychotic persons and schizophrenic persons.¹ His behavioral observations and qualitative analysis of verbal logic revealed differences in language organization between persons having these diagnostic classifications. Using incomplete causal sentences, Cameron observed in the schizophrenic persons' language a loose cluster organization of terms instead of restricted and organized concepts. This he called asyndesis. In addition, he noted the schizophrenic persons' thinking included substitute terms and phrases and the use of highly individual idioms, making communication with others difficult at best.

In a monograph² Cameron presented the rudiments of his theoretical position regarding schizophrenic thinking, asserting that communication difficulties encountered during schizophrenia were unique, in the sense that the peculiarities

1 Norman Cameron, 'A Study of Thinking in Senile Deterioration and Schizophrenic Disorganization', American Journal of Psychology, Vol. 51, No. 4, 1933, p. 650-665.

2 -----, "Reasoning, Regression and Communication in Schizophrenics", Psychological Monographs, Vol. 50, whole No. 221, 1936, p. 1-34.

could not be prudently accounted for in terms of regression.

His contention was that there

[...] is little evidence to be gathered through a study of causal reasoning and antithetical relations of schizophrenia to support the assumption that one is witnessing a 'peeling'; the disorganization seems to be really a process of disintegration rather than one of delamination.³

His acumen provided a vivid and penetrating description of schizophrenic thinking, which manifested a loose structure and contradictory elements. The author reasoned that the conglomeration of thinking deviations was superimposed upon faulty concept formation. In this publication Cameron also makes reference to the phenomenon of overinclusion when discussing the difficulties which arise in problem-solving situations, especially in dealing with hypothetical and abstract matters. He reports that the "relatedness of the material is, however, often very distant, the restriction to the problem is loose and too inclusive."⁴ Concomitant with this phenomenon was a defect in selection and elimination.

Elsewhere,⁵ Cameron analyzed the thinking of schizophrenic persons, normal children and senile psychotic persons. He pointed out that schizophrenic thinking was essentially

³ Ibid., p. 6.

⁴ Ibid., p. 18.

⁵ Norman Cameron, "Deterioration and Regression in Schizophrenic Thinking", Journal of Abnormal and Social Psychology, Vol. 34, No. 2, 1939, p. 265-276.

different from that of children and something new in the person's life. Comparing the schizophrenics with the senile patients on a problem solving-task the author noted that both were relatively unsuccessful in reaching solutions, but for different reasons. The schizophrenic persons were versatile and flexible in their problem solving attempts, but had little success because they included such a variety of categories at one time that specific problems became too extensive and complex. The senile persons, on the other hand, suffered from restriction.

In another qualitative study of schizophrenic thinking Cameron⁶ focussed on both language behavior and manipulation using the Ranfmann-Kasanin Sorting Test. In this study the phenomenon of overinclusion, incidentally mentioned in earlier studies, was elaborated as the

[...] inability to select and restrict, and to eliminate the less closely related elements from the conceptual structure which means that the psychological boundaries are functionally insufficient. The result of the situation is over-inclusion. The inadequate demarcation of boundaries, which can be observed in schizophrenic thinking, operates so as to include too great a diversity of material in a given situation.⁷

The author also noted that the schizophrenic persons, in attempting to solve problems, were capable of shifts from one hypothesis to another without unusual difficulty.

⁶ Norman Cameron, "Schizophrenic Thinking in a Problem-Solving Situation", Journal of Mental Science, Vol. 85, 1939. p. 1012-1035.

⁷ Ibid., p. 1019.

A paper presented by Cameron⁸ dealt with the social implications of thinking and language behavior and the consequences of the schizophrenic individual's peculiar mode of communication. Once again overinclusion was cited as the phenomenon which frequently disrupted their communication, reference being made to earlier research with ^{sorting}scoring problems. He noted that these individuals could not maintain conceptual boundaries nor could they narrow down their problem-solving operations sufficiently to facilitate an organized approach or specific responses to the problems presented.

Cameron also extended the phenomenon of overinclusion to other pathological conditions.^{9,10} He pointed out the generally undermining influence upon an individual's competence and adequacy in behavior organization, particularly in situations demanding the formulation of hypotheses which would facilitate the person's coming to grips with a specific situation. At the same time he remarks of the need for inclusion of possible variant reactions in relatively unpredictable, developing situations in order to maintain suitable

⁸ Norman Cameron, 'Experimental Analysis of Schizophrenic Thinking', in J.S. Kasanin, (ed.), Language and Thought in Schizophrenia, Berkeley and Los Angeles, University of California Press, 1946, v-133 p.

⁹ -----, The Psychology of Behavior Disorders, Boston, Houghton Mifflin, 1947, vii-622 p.

¹⁰ Norman Cameron and Ann Margaret, Behavior Pathology, Boston, Houghton Mifflin, 1951, v-645 p.

adaptive behavior in changing circumstances. More recent formulations by the author^{11,12} link the phenomenon to unstable ego organization in order to account for a wide range of behavior. The principle of behavioral organization remains central, however.

The presentation thus far has been restricted to the theoretical core providing a foundation for numerous subsequent experimental studies dealing with overinclusion. Cameron's work itself reflects keen insight and the ability to make meaningful deductions and assertions from observation despite methodological difficulties. While the experimental situations may fall short of the rigid experimental criteria, his thinking was and is precise. The studies which have evolved from his original thinking will be presented now in an effort to show the further development of his ideas.

Epstein¹³ posed several research questions concerning overinclusion and set out to answer them by comparing the performance of schizophrenic persons with that of normal persons on a test which he developed as a measure of overinclusion.

11 Norman Cameron, "Perceptual Organization and Behavior Pathology", in Robert R. Blake and Glenn V. Ramsey, (eds.), Perception - An Approach to Personality, New York, Ronald Press, 1951, 111-442 p.

12 -----, Personality Development and Psychopathology: A Dynamic Approach, Boston, Houghton Mifflin, 1963, v-793 p.

13 Seymour Epstein, "Overinclusive Thinking in a Schizophrenic and a Control Group", Journal of Consulting Psychology, Vol. 17, No. 5, October, 1953, p. 384-388.

(More will be said about this test in the following chapter since it was one of the tools used in the present investigation.) His major finding was that schizophrenic persons overincluded significantly more than matched controls, matching being on the variables of age and vocabulary level. In addition he noted that overinclusion was not related to sex, subtype or schizophrenia, vocabulary level or abstract reasoning, the latter two variables being assessed with the Shipley-Institute of Living Scale.

Using Epstein's test, Payne and Hirst¹⁴ studied overinclusion in a group of eleven depressive individuals between the ages of thirty-three and fifty-six and found that these individuals overincluded significantly more than a group of normal persons. The authors suggested, on the basis of their findings, that overinclusion may be related to psychoticism rather than just to schizophrenia. Their study can be criticized for employing a small sample, thereby making generalizations suspect.

Payne, et al.,¹⁵ in a somewhat more ambitious project, tested a number of predictions from Cameron's theory using an

¹⁴ R.W. Payne and Heather L. Hirst, "Overinclusive Thinking in a Depressive and a Control Group", Journal of Consulting Psychology, Vol. 21, No. 2, 1957, p. 186-188.

¹⁵ R.W. Payne, P. Matussek and E.I. George, "An Experimental Study of Schizophrenic Thought Disorder", Journal of Mental Science, Vol. 105, No. 440, July, 1959, p. 627-652.

REVIEW OF THE LITERATURE

experimental group of eighteen schizophrenic persons, twelve men and six women, and a control group of sixteen neurotic individuals, seven men and nine women. None of the schizophrenic persons were considered chronic although some had been hospitalized one more than one occasion. It was assumed that the diagnosis of neurosis implied no formal thought disorder.

The findings indicated that schizophrenics over-included more than neurotics on several measures of over-inclusion, one of which was the Spatein Inclusion Test. On the basis of the schizophrenics' sorting behavior, which was also interpreted as a measure of overinclusion, the schizophrenics were described as being more "creative" than the neurotics and able to generalize more easily. This study was also an attempt to test Payne's own Filter Theory as a way of accounting for overinclusion. This theory is an adaptation of Broadhurst's neurological theory of communication.¹⁶ Payne does not seem to make a distinction between creativity and overinclusion in this study.

¹⁶ Dawn A. Campbell, "Attentional Variables and Reaction Time of Overinclusive Schizophrenics and Depressives", unpublished M.A. thesis, Queen's University, Kingston, October, 1962, 111-96 p.

Chapman and Taylor¹⁷ sought to isolate stimulus conditions that result in certain types of errors made by schizophrenic persons on a conceptual sorting task when compared with normal persons. The subjects were asked to sort words naming objects falling into three conceptual categories, two of which were similar to one another, and the third dissimilar. The subjects were then asked to separate items belonging to one of the similar categories from the remaining items. It was expected that for the schizophrenics, but not the normals, the items incorrectly included would more often be from the similar incorrect category than from the incorrect dissimilar one. The errors made were interpreted as reflecting an inappropriate broadening of concepts. The findings supported the contention that schizophrenics' inferiority in conceptual tasks is due to an over-responsiveness to inappropriate stimuli rather than loss of conceptual ability per se. What may be inappropriate for one task may be appropriate for another--e.g., over-responsiveness to stimuli may interfere with adequate performance on one type of task, but not on another where this is desirable and appropriate.

17 Loren J. Chapman and Janet A. Taylor, 'Breadth of Deviate Concepts Used by Schizophrenics', Journal of Abnormal and Social Psychology, Vol. 54, No. 1, 1957, p. 115-123.

In another study Chapman¹⁸ tested the hypotheses that schizophrenics' substitution of associative responses for correct responses is due to heightened susceptibility to associative connections as well as a primary loss of ability to perform correctly. Both hypotheses were supported, leading the author to conclude that these persons had difficulty in forming concepts and were also unable to discriminate easily among associations which distracted them from the task at hand. The study was carried out with two groups of men, one schizophrenic and one normal, thereby setting certain limitations on the generalizations which could be made. Also, the conclusion of a certain loss of conceptual ability is not consistent with the previous study, but no attempt at clarification was made.

Searching for "factors" which might be related to overinclusion, Chapman examined the kinds of concepts which schizophrenic individuals preferred on a sorting task.¹⁹ He observed that errors of overinclusion decreased as the conceptual category became broader. Therefore, as opportunities for broader concepts increase, the person's behavior is more acceptable, appropriate and less deviant.

¹⁸ Loren J. Chapman, "Intrusion of Associative Responses into Schizophrenic Conceptual Performance", Journal of Abnormal and Social Psychology, Vol. 56, No. 3, 1958, p. 374-379.

¹⁹ -----, "A Reinterpretation of Some Pathological Disturbances in Conceptual Breadth", Journal of Abnormal and Social Psychology, Vol. 62, No. 3, 1961, p. 514-519.

In an attempt to lend further support to the over-inclusion theory of conceptual deficit, Chapman et al.²⁰ sought to rule out regression as a way of accounting for conceptual peculiarities encountered in schizophrenia. Using groups of brain damaged individuals, normal children and schizophrenic individuals, the researchers concluded that:

There is no blanket similarity between the error patterns of children and of either schizophrenics or brain damaged patients and the use of the term 'regression' to imply such a blanket similarity is not justified.²¹

This conclusion is essentially the same as that reached earlier by Cameron on the basis of his observations.²²

Recognizing the consistent finding that some schizophrenic persons demonstrate a tendency toward overinclusion, Eliseo explored this hypothesis from another point of view.²³ Using a group of general medical and surgical patients as controls he sought relationships between overinclusion, process schizophrenia and reactive schizophrenia. On the basis of scores obtained on the Epstein Inclusion Test the investigator

²⁰ L.J. Chapman, Alvin Burstein, Dorothy Day and Paul Verdone, "Regression and Disorders of Thought", Journal of Abnormal and Social Psychology, Vol. 63, No. 3, 1961, p. 540-545.

²¹ Ibid., p. 545.

²² Cameron, "Deterioration and Regression in Schizophrenic Thinking", p. 265-270.

²³ Thomas S. Eliseo, "Overinclusive Thinking in Process and Reactive Schizophrenics", Journal of Consulting Psychology, Vol. 27, No. 5, 1963, p. 447-449.

concluded that there were, in fact, no differences in degree of overinclusion among the groups. He submitted that overinclusion may be characteristic of depression or chronic illness in general, rather than specific to schizophrenia. His thinking is consistent with Cameron who, in his latest work, mentions that the concept has been broadened to account for a wide range of behavior organization,²⁴ and also with Payne and Hirst.²⁵

Nickols²⁶ studied overinclusion with particular attention to the conditions under which it had been observed by other investigators. He raised the question that perhaps the design of previous experiments had been such as to facilitate the tendency because of such "factors" as the ability to conceptualize visual material verbally, the acquired ability to deal with verbal materials and the ability to follow directions. Reasoning that if these "factors" were not substantially related to overinclusion then an experimental situation in which these tendencies would be incidentally useful should also demonstrate the tendency toward overinclusion. In his experiment the mean overinclusion scores for the experimental and

²⁴ Cameron, Personality Development and Psychopathology: A Dynamic Approach, v-793 p.

²⁵ Payne and Hirst, Op. Cit., p. 186-188.

²⁶ John Nickols, "Overinclusion under Unstructured Conditions", Journal of Clinical Psychology, Vol. 20, No. 4, 1964, p. 422-429.

control groups were similar. Also, he noted that the schizophrenic individuals exhibited less sensitivity to contrast attributes of external stimuli than did the non-schizophrenic persons.

Dissatisfied with both the conflicting findings pertaining to the conceptual ability of schizophrenic persons and the theoretical explanations offered to account for their difficulty, Nathan²⁷ attempted to look more closely at the process of concept formation. In order to identify some of the possible hypothetical determinants of conceptual behavior he constructed a test which he called a Battery of Conceptual Instruments. Using his test, he was unable to find differences among three groups of men, normals, acute schizophrenics and chronic schizophrenics. However, the trends seen in his results prompted him to state some support for Cameron's position.

Hoping to assess the relative merits of Goldstein's position regarding schizophrenic deficit as resulting from concreteness and Cameron's contention that overinclusion can best account for the difficulty, Sturm²⁸ studied the thinking of four groups of persons. He included in his study forty

²⁷ Peter E. Nathan, "A Comparative Investigation of Schizophrenic and Normal Conceptual Performance", Journal of Nervous and Mental Disease, Vol. 130, No. 5, May, 1964, p. 443-451.

²⁸ Israel Eli Sturm, "Overinclusion and Concreteness Among Pathological Groups", Journal of Consulting Psychology, Vol. 29, No. 1, 1965, p. 9-18.

tuberculous, forty brain damaged, thirty process schizophrenic and fifteen reactive schizophrenic hospitalized veterans. Using a revised form of Epstein's Inclusion Test, the groups were not differentiated on the basis of overinclusion, leading the author to suggest the partial validity of Goldstein's position.

While the results of the study are important, other aspects are equally important. The author provides a comprehensive review of both theoretical positions as well as a review of the studies which have employed the Inclusion Test. Because of conflicting opinions regarding the usefulness and validity of Epstein's instrument as a measure of overinclusion, the author decided that a sharpening of its discriminating power was necessary. More will be said about this in a later section of the report. At this point several other publications must be considered in order to complete the theoretical exposition of the present study.

The first of these publications is that of Lothrop.²⁹ In his article he reviewed the contributions of many researchers to the understanding of schizophrenic thinking; sixty-seven publications were reviewed. With regard to the overinclusion hypothesis as an explanation for conceptual impairment, Lothrop concludes that:

²⁹ William W. Lothrop, 'A Critical Review of Research on the Conceptual Thinking of Schizophrenics', Journal of Nervous and Mental Disease, Vol. 132, No. 2, February, 1961, p. 115-126.

Supporters of this hypothesis have argued that conceptual ability merely seems impaired because adequate conceptual ability is prevented by this over-responsiveness to extraneous stimuli. There is some evidence that overinclusiveness and impaired conceptualization occur together which might lend some support to this hypothesis.³⁰

In discussing future research possibilities the author advocates closer attention to differences in performance within the schizophrenic population. The implication here is that not all schizophrenic individuals demonstrate a marked tendency toward overinclusion.

Another review of the literature pertaining to over-inclusion has been presented by Payne.³¹ His publication, considering some forty articles, takes into account the findings up until 1960. The author summarizes the "knowns and unknowns" with regard to overinclusion at the time of his writing. Introducing some of them here will accomplish a reduction of available information to certain essentials and hopefully, enhance the theoretical exposition. The author concludes that:

³⁰ Ibid., p. 122.

³¹ R.W. Payne, "Cognitive Abnormalities", in H.J. Eysenck, (ed.), Handbook of Abnormal Psychology, New York, Basic Books, 1961, v-816 p.

Some schizophrenics employ abnormally overinclusive concepts in the sense that they incorporate ideas which for normal people are only peripherally related, or irrelevant. Overinclusion makes their thinking both more abstract and more vague. It may be due to a specific learning disability, an abnormal degree of stimulus generalization perhaps caused by a defect in the ability to develop inhibition. These abnormalities of concept formation may partly explain why some schizophrenics tend to make an abnormal number of errors on some cognitive tests.³²

More recently, Lang and Buss^{33,34} have undertaken the ambitious project of reviewing the studies dealing with the psychological deficit encountered in schizophrenia. Their publications consider not only theoretical aspects but methodological problems as well, and are therefore of considerable importance to this research.

Discussing concept attainment in the earlier publication the authors consider four theoretical explanations advanced to account for peculiarities seen in schizophrenia. One of these is Interference Theory, taking into account overinclusion and attention. The two variants of the theory, each with its particular emphasis, are not mutually exclusive and lend support to one another in the overall theoretical formulation. Actually,

³² Ibid., p. 250.

³³ Arnold H. Buss and Peter J. Lang, "Psychological Deficit in Schizophrenia: I. Affect, Reinforcement and Concept Attainment", Journal of Abnormal Psychology, Vol. 70, No. 1, February, 1965, p. 1-24.

³⁴ ----- and -----, "Psychological Deficit in Schizophrenia: II. Interference and Activation", Journal of Abnormal Psychology, Vol. 70, No. 2, April, 1965, p. 77-106.

the attention hypothesis can more accurately be considered as an attempt to explain the phenomenon of overinclusion and indirectly, therefore, provide an explanation of conceptual deficit.

Some broad conclusions have been reached on the basis of research. First, attention appears to be a variable which needs further investigation as a possible explanation of overinclusion. Second, not all schizophrenic persons are overinclusive; some have been found to be overexclusive which, according to the literature, is the opposite tendency and presupposes a continuum. Third, some schizophrenics alternate between these two 'poles'. In their second publication, the authors conclude that

[...] interference theory, as a broad explanation of schizophrenic deficit, has clearly been supported by research findings and appears to be the only theory comprehensive enough to account for what is known.³⁵

The presentation thus far has been an attempt to elucidate the general theory from which this study developed. It has been pointed out in the previous pages that various researchers have reported implicitly or explicitly, and at times incidentally, a possible relationship between over-inclusive concept formation and creative thinking.

Frequently, unusual or atypical behavior, particularly with respect to performance on sorting tasks, has been

³⁵ Ibid., p. 17.

interpreted negatively in the sense that subjects did not do well on these tasks. Their "errors" have been called creative thinking. To the writer it does not seem that negative aspects of one task can simultaneously be interpreted in a positive manner, i.e. creative thinking. Overinclusion has also been used interchangeably with creative thinking.

The aim of this research is to explore the possibility of relationships between overinclusion and creative thinking. In so doing the position taken is that overinclusion and creative thinking are not the same, but rather two separate phenomena which may somehow be related. The next section will be devoted to an elaboration of creative thinking which is equated with divergent thinking in this study.

2. Divergent Thinking.

Divergent thinking, as encountered in schizophrenia, has not been investigated extensively. Two studies relevant to this research will be mentioned in this section.

In the contemporary literature divergent thinking is, in many ways, synonymous with the name Guilford, and occupies a place in his multi-dimensional structure of the Intellect

which has been reported in several publications.^{36,37,38,39,40} For the sake of clarity and economy of thought, the most recent of these can serve as a comprehensive single source to provide the nucleus of the presentation here.

Divergent thinking is one of the "major kinds of intellectual activities or processes; things that the organism does with raw materials of information (that which the organism discriminates)".⁴¹ In the words of Guilford, divergent thinking is defined as "generation of information from given information where the emphasis is upon variety of output from the same source".⁴² This category of thinking operations is comprised of various factor abilities, six of which were considered in this research. These are listed and defined below:⁴³

36 J.P. Guilford, "Structure of Intellect", Psychological Bulletin, Vol. 53, No. 4, 1956, p. 267-293.

37 -----, A Revised Structure of Intellect, Reports from the Psychological Laboratory, No. 19, University of California, 1957, () p.

38 -----, Personality, New York, McGraw-Hill, 1957, xiii-562 p.

39 -----, "Three Faces of Intellect", American Psychologist, Vol. 14, 1959, p. 467-477.

40 ----- and P.R. Merrifield, The Structure of Intellect Model: Its Uses and Implications, Reports from the Psychological Laboratory, No. 24, University of Southern California, April, 1960, 27 p.

41 Ibid., p. 5.

42 Ibid., p. 5.

43 Ibid.

1.- Word Fluency: The ability to produce rapidly words fulfilling specified symbolic requirements - divergent thinking about symbolic material resulting in relatively segregated or circumscribed items of information having "thing" character (units).

2.- Ideational Fluency: The ability to call up many ideas in a situation relatively free from restrictions where quality of response is unimportant - divergent thinking about semantic material resulting in units.

3.- Expressional Fluency: The ability to produce organized discourse - divergent thinking about symbolic material resulting in organized or structured aggregates of information; complexes of interrelated or interacting parts (systems).

4.- Associational Fluency: The ability to produce words from a restricted area of meaning - divergent thinking about semantic material resulting in recognized connections between units of information based upon variables that apply to them (relations).

5.- Semantic Spontaneous Flexibility: The ability or disposition to produce a diversity of ideas when free to do so - divergent thinking about semantic material resulting in aggregates of items of information grouped because of their common properties (classes).

6.- Originality (Adaptive Flexibility): The ability or disposition to produce uncommon, remotely associated or clever responses - divergent thinking about semantic material resulting in changes in existing or known information, or in its use, as in production (transformations).

In order to preserve a dialogue with the mainstreams of related literature, it is important to note that Guilford equates creative thinking with divergent production, but indicates that this is not an absolutely veridical assumption.⁴⁴ Elsewhere, he describes divergent thinking in the following manner:

⁴⁴ Ibid., p. 11.

[...] generally, within whatever limits are imposed by external restrictions, the need for rejecting or superseding a response and for trying or producing a new one is the common element in this group of factors. There is also a difference in the amount of self-imposed restriction or freedom. This depends upon the individual rather than upon the situation. It is largely in this source of variation that we find the divergent-thinking factors.⁴⁵

Divergent thinking then, is a kind of intellectual operation, in Structure-of-Intellect terms, which is characterized predominantly by flexibility and production. It is equated with creative thinking and defined in terms of six abilities in this study. Attention must now be given to certain experimentation carried out to study divergent-thinking abilities. Two studies directly investigating divergent thinking, as encountered in schizophrenic persons, are pertinent to this research.

The first of these studies was conducted by Al-Issa⁴⁶ in an attempt to uncover possible correlates of divergent-thinking abilities. The subjects of the study were thirty-six chronic schizophrenic persons randomly selected from a larger group of eighty-six. The age range was from twenty-five years to sixty-one years, with a mean age of 47.02 years. Intelligence, based upon the Wechsler Vocabulary score, ranged between

⁴⁵ Guilford, "Structure of Intellect", p. 261.

⁴⁶ Ishan Al-Issa, "Creativity and Its Relationship to Age, Vocabulary, and Personality of Schizophrenics", British Journal of Psychiatry, Vol. 110, 1964, p. 74-79.

a quotient of seventy-three and a quotient of 123. The mean intelligence quotient for the group was 98.55. Tests of Adaptive Flexibility, Spontaneous Flexibility, Originality and Ideational Fluency were administered to the subjects in groups of three. Eysenck's Personality Inventory was also administered.

A significant positive relationship, correlations between .51 and .70, was found between vocabulary scores and divergent-thinking scores. On the other hand, a negative relationship was found between age and divergent-thinking abilities. Neuroticism was found to be positively correlated with creativity. On the basis of the findings the author hypothesizes that in certain cases mental illness may facilitate creative productivity and that among chronic schizophrenic persons, at least, creativity is the product of interacting variables. The question here is which of the variables of mental illness in addition to those investigated by the author, operate in such a way as to facilitate creative thinking among schizophrenic persons.

The author offers no theoretical position upon which the investigation was based and the findings, while useful from the standpoint of experimental design, cannot be readily used to substantiate one theoretical position or another with regard to unusual thinking associated with schizophrenia.

Another study conducted by Al-Issa and Robertson⁴⁷ had as its objective an assessment of possible relationships between divergent thinking and formal thought disorder, neuropsychiatric symptoms and other variables such as work efficiency. The subjects for the study were thirty-six chronic schizophrenic individuals, seventeen women and nineteen men. All of the subjects were described as being in stable hospital employment and receiving consideration for discharge. Length of hospitalization ranged from four to thirty-six years, the mean being 14.7 years.

The same divergent-thinking abilities investigated in the previously mentioned study by Al-Issa were considered in this project. Thought disorder was established on the basis of scores derived from the Repertory Grid Test and the Pin-Can Test. The former test is concerned with the mutual relationships of concepts, the latter with verbal bizarreness, conceptualization of descriptions and typicality of descriptions. Various kinds of information pertaining to ten neuropsychiatric symptoms, e.g., delusions, hallucinations and flatness of affect were collected from the nursing staff.

A significant relationship ($p < .05$) was found between psychometrically assessed thought disorder and divergent-thinking

⁴⁷ Ishan Al-Issa and James Patrick S. Robertson, 'Divergent Thinking Abilities in Chronic Schizophrenia', Journal of Clinical Psychology, Vol. 20, No. 4, 1964, p. 433-435.

scores. The presence of thought disorder was associated with lower scores in tests of divergent thinking. Male sex was associated with higher scores on tests of Symbolic Adaptive Flexibility and Semantic Spontaneous Flexibility. Age below thirty-five and previous occupation above the skilled level were associated with higher scores on Symbolic Adaptive Flexibility and Originality.

This study also lacks theoretical foundation and can be criticized for not having made use of a control group which would have given the findings more credibility. In addition, the authors fail to report any reliability coefficients for the tests which were employed, or for the scoring of the test of Originality which is not as objective as the other tests in the battery.

The next and closing section of this chapter will present the writer's attempt to use the Structure-of-Intellect model in order to test a deduction made from Interference Theory.

3. Summary and Hypotheses.

Interference Theory asserts that one aspect of thought disorder, namely, impaired concept formation, can be accounted for in terms of overinclusion. The peculiarities of concept formation resulting from this tendency or phenomenon have been observed in many studies, most classically, perhaps, among schizophrenic persons, some of whom demonstrate a marked affinity for overinclusive concepts.

It has been reported that persons carrying out thinking operations with overinclusive concepts often exhibit an inability to reach adequate and appropriate solutions to tasks which call for a single, specific and precise cognitive formulation in order to be dealt with efficiently and effectively. The experimental analogue of everyday situations has frequently been some variety of sorting task.

It may be reasoned that individuals who form concepts which embrace many more aspects of the "object" than is necessary may, at least partially, abandon the denotative aspects of a concept in favour of the connotative aspects. This hypothesis has been advanced by Johnson⁴⁸ in discussing increased imaginative activity which he sees as possibly being a factor common to both schizophrenic thinking and creative thinking.

If thinking can be reduced and oversimplified for a moment to concept formation and concept processing, it may be argued from the standpoint of Interference Theory that degrees of disturbance in classificatory induction, overinclusion, could promote creative thinking. It is also possible that certain aspects of creative thinking may be facilitated more than others, i.e., overinclusion may have selective effects

⁴⁸ Richard E. Johnson, "Imaginative Sensitivity in Schizophrenia", Review of Existential Psychology and Psychiatry, Vol. 4, No. 3, Fall 1964, p. 255-264.

within the total process. Apropos to such a consideration, Payne has the following to say regarding overinclusion:

Overinclusion might be regarded as some failure of the mental filter mechanism which excludes stimuli which are irrelevant to the action of the moment. This could partly account for the cognitive slowness in some schizophrenics, which could be due to the fact that these individuals consider aspects of cognitive problems excluded as irrelevant by normal people. This same abnormality might be the direct cause of the abnormal flexibility (both adaptive and creative) and originality of some schizophrenic patients.⁴⁹

Investigating certain divergent-thinking abilities of schizophrenic persons in the light of the theoretical position presented here would increase the scope of inferences which could be made since divergent thinking subsumes not only factors of flexibility, but others as well. The use of factor concepts offered by the Structure-of-Intellect model should provide a more specific quantification and meaningful understanding of the impact of peculiar concept formation upon subsequent thinking operations.

It is with these ideas in mind that three statistical hypotheses were formulated to be tested within the framework discussed in the next chapter. First, there are no significant relationships between overinclusion and divergent-thinking abilities. Second, there are no significant differences among

⁴⁹ R.W. Payne, "Cognitive Abnormalities", in R.J. Eysenck, (ed.), Handbook of Abnormal Psychology, New York, Basic Books, 1961, p. 250.

the relationships between overinclusion and divergent-thinking abilities. Third, there are no significant differences in divergent-thinking abilities among groups of schizophrenic individuals classified as low, middle and high scorers on a test of overinclusion.

CHAPTER II

EXPERIMENTAL DESIGN

The hypotheses advanced in the preceding chapter of this report were tested within the experimental framework to be presented here. This chapter is divided into four sections, each treating an aspect of the total design. Section One offers a description of the population from which the sample was taken and a discussion of the sampling procedure. Section Two presents a description of the principal psychological tools used in the study. Sections Three and Four deal respectively with the procedure followed in executing the testing involved in the project, and the statistical analysis of the obtained data.

1. Sampling Procedure.

The project was carried out with patients admitted to the Fairfield Hills Hospital, Newtown, Connecticut, during the period of January-September, 1964.¹ This installation is one of three state mental hospitals in Connecticut and serves principally Fairfield, Litchfield and New Haven counties, with a combined population of 1,440,675 persons, or approximately

¹ All demographic and admission statistics have been taken from the publication Connecticut's State Mental Hospitals, Hartford, Connecticut State Department of Mental Health, 1964, () p.

half the population of the state, according to 1961 census estimates.

Subjects for the experiment were selected from among admissions to the hospital according to the following criteria:

- 1.- Age range twenty-one to fifty-five;
- 2.- English speaking and educated in North America;
- 3.- Minimum of eighth grade education;
- 4.- At least average intelligence;
- 5.- No diagnosed central nervous disorder either permanent or temporary, including Electro-Convulsive therapy;
- 6.- Psychiatric diagnosis of schizophrenic reaction.

The first of these criteria was decided upon for two reasons, namely, to restrict the study to adult persons and also to limit the possibility of substantial intellectual deterioration. The second, third and fourth criteria were established in order to be reasonably certain that the subjects could understand the test instructions, as well as to minimize cultural differences. The fifth criterion was set in order to rule out possible influences of central nervous system dysfunction upon test performance. This criterion was assumed to be met by the diagnostic procedure. The last restriction of subjects was introduced in order to facilitate generalizations about a specific universe.

The first three of the criteria listed above were established by a search of the patients' records. Intelligence

was assessed verbally using a modified form of the WAIS Vocabulary subtest.^{2,3} The short form of the Vocabulary subtest has been found to correlate .97 with the original subtest which in turn correlates from .69 to .90 with the WAIS Verbal Scale I.e., within most of the age range of the subjects included in the study.⁴ A measure of intelligence was included primarily to provide additional descriptive information pertaining to the subjects. The procedure according to which the diagnostic classification was reached involved three psychiatrists, the Clinical Director, Chief of Male Service and a consultant. All diagnoses were established within seven days from the person's admission date.

For 1964, within the age range mentioned above, 113 persons admitted to the institution subsequently received the diagnostic classification of schizophrenic reaction. The total number of persons with this diagnosis admitted during the year was 601, between the ages of fifteen and seventy-five and over. Thus, the sample for this study was drawn from within the age

² Paul Satz and S. Mogel, "An Abbreviation of the WAIS for Clinical Use", Journal of Clinical Psychology, Vol. 18, No. 1, 1962, p. 77-79.

³ Steve Mogel and Paul Satz, "Abbreviation of the WAIS for Clinical Use: An attempt at Validation", Journal of Clinical Psychology, Vol. 19, No. 3, 1963, p. 298-300.

⁴ David Wechsler, Manual for the Wechsler Adult Intelligence Scale, New York, The Psychological Corporation, 1955, 111-110 p.

range which comprised approximately eighty-five per cent of the total number of admissions with the same diagnostic classification.

In terms of sex, 311 women were admitted to the institution. Two hundred and sixty-five of these were within the age range of this study. Two hundred and ninety men were admitted, 248 being within the age range included in the investigation. Therefore, eighty-five percent of the total number of female admissions was included within the age range sampled and eighty-five per cent of the male admissions. Persons with prior admission to a psychiatric in-patient facility outnumbered those with none approximately 2.5 to one for both sexes.

With these general descriptive facts in mind the actual sampling procedure and sample population can be described more meaningfully. At the end of each week the current list of admissions was checked and screened according to age, place of birth, educational setting, level achieved and diagnostic classification. If a person met these criteria, the measure of intelligence mentioned earlier was administered individually. The individual contact with each person enabled the investigator to not only assess his endowment, but his behavior as well, since management problems had to be considered for administrative reasons. At the time of this initial contact between the researcher and patient a general explanation of the research

was given in an attempt to enlist his or her cooperation. This was not a prepared speech because adjustments needed to be made as circumstances warranted. Nevertheless, several points were invariably communicated to the prospective subject. First, an explanation was given as to why the patient was being contacted by the writer. Second, assurance was given that he or she had the prerogative to refuse participation in the study, and that neither participation nor refusal had any bearing upon either their status while in the hospital or discharge. Third, it was made clear that all documents would remain confidential.

Of the persons admitted during the January-September period who met the age and diagnostic requirements of the study, 249 who had attained at least an eighth grade education in North America were interviewed and administered the intelligence scale according to the procedure discussed above. On the basis of this interview and testing two persons were excluded because it was virtually impossible to communicate with them and 170 failed to achieve at least an average intelligence quotient. Subsequently, two persons exercised their prerogative and refused to continue with the testing procedure. The final sample achieved comprised seventy-five persons, forty-two women and thirty-three men, fifty-nine of whom were receiving medication.

Six types of tranquilizing medication were represented in the sample, namely, Trilafon (a perphenazine), Stelazine (trifluoperazine), Thorazine (chlorpromazine), Etrafon (a perphenazine and amitryptiline combination), Mellaril (thioridazine), and Elavil (chlordiazepoxide). Of the medication issue, Chapman⁵ concludes from his study of thought disorder under medicated and non-medicated conditions that findings based on subjects who do not profit from tranquilizing medication may be limited in their generality. Testing was then conducted according to the procedure to be discussed in a later section of this chapter. At this point a discussion of the principal psychological tools used is in order and will be undertaken in the next section.

2. Measures of Overinclusion and Divergent Thinking.

Seven paper-and-pencil type tests served as the principal tools of study. In keeping with the order of presentation established in Chapter One, the measure of overinclusion will be discussed first, followed by a discussion of the six tests of divergent thinking.

Overinclusion was assessed by the Inclusion Test which is described by the author as follows:

⁵ Loren J. Chapman, "The Problem of selecting Drug-Free Schizophrenics for Research", Journal of Consulting Psychology, Vol. 27, No. 6, 1963, p. 540-542.

⁶ Gratitude is expressed to Seymour Epstein for providing a copy of the test and scoring instructions, and permission to reprint copies of both.

The test is composed of 50 items, each consisting of a key word followed by five response words and the word 'none'. The testee is instructed to underline all response words which designate things or concepts required for the complete thing described by the keyword. An example of an item is as follows:

Man arms shoes hat toes head none

A correct performance requires underlining the response words arms, toes and head, as every complete man must have, among other things, arms, toes and a head. For each correct choice omitted a score of one underinclusion is received; for each incorrect choice selected, a score of one overinclusion is obtained. [...] The scoring system for the Inclusion Test was determined by an item analysis of data obtained from a preliminary administration to 61 college students. In its final form the college group made an equal number of errors of overinclusion and underinclusion.⁷

There is no time limit for the test and most subjects complete it within less than fifteen minutes. At the time this project was initiated Epstein had been cited by Payne and Hirst as having "contributed enormously to the operational definition of 'overinclusion' by developing a simple paper-and-pencil measure of this aspect of thought disorder."⁸ A copy of this test is included in Appendix 1 of the manuscript.

Recently, Sturm⁹ has attempted a revision of the Inclusion Test, following a review of studies in which it was

⁷ Seymour Epstein, "Overinclusive Thinking in a Schizophrenic and a Control Group", Journal of Consulting Psychology, Vol. 17, No. 5, October 1953, p. 354.

⁸ R.W. Payne and Heather L. Hirst, "Overinclusive Thinking in a Depressive and a Control Group", Journal of Consulting Psychology, Vol. 21, No. 2, 1957, p. 186.

⁹ Israel Eli Sturm, "Overinclusion and Concreteness Among Pathological Groups", Journal of Consulting Psychology, Vol. 29, No. 1, 1965, p. 9-18.

used and a re-examination of the concept of overinclusion on which the test was based. His conclusion was that there was sufficient evidence to question the validity of the test as a measure of overinclusion. It should be pointed out, however, that questions raised are based upon frequently inconsistent findings when the instrument was used to discriminate between clinical groups. The instrument was not used for this purpose in the present study. Unfortunately, his modifications were such that could not be included in the present study, as it neared completion, in order to see if differences could be found.

The writer was therefore prepared to accept the validity of the measure until such time as further research with the newer instrument is presented in the literature. Operationally then, for this study, overinclusion is defined in terms of a subject's score on the Inclusion Test. The operational referents of the dependent variable will now be discussed.

Divergent thinking, as pointed out earlier, was defined in terms of six factor abilities in this study. Each ability was represented by a test.¹⁰ In this study alternate halves (forms) of each test were used in order to provide a means of establishing a reliability within a short period of time and also, to reduce to a minimum, the period of time

¹⁰ Sheridan Supply Company, P.O. Box 837, Beverly Hills, California.

the subjects would be confined under special conditions not necessarily suitable for dealing with potential erratic behavior. Such a procedure for establishing reliability is in keeping with the construction of instruments and is suggested by the test authors.^{11,12,13}

For each test, the task of the subject is clearly indicated on the accompanying page of directions. The scoring is a simple count of acceptable responses according to the criteria presented in the manuals. More will be said about these points in subsequent sections of the report. Copies of the tests can be found in Appendix 2. In order of their appearance in the appendix Associational Fluency, Expressional Fluency and Ideational Fluency are measures of factors having the same name. Consequences provides a measure of the factor Originality and Alternate Uses is the measure of the ability called Semantic Spontaneous Flexibility. Word Fluency is a measure of a factor having the same name. More precisely, two scores are derived from the Consequences test, obvious and

11 P.R. Christensen and J.P. Guilford, Manual for the Christensen-Guilford Fluency Tests, Second Edition, Beverley Hills, Sheridan Supply Co., 1959, 8 p.

12 R.C. Wilson, P.R. Christensen, P.R. Merrifield and J.P. Guilford, Alternate Uses, Manual for Administration, Scoring and Interpretation, Second Preliminary Edition, Beverley Hills, Sheridan Supply Co., 1960, 7 p.

13 P.R. Christensen, P.R. Merrifield and J.P. Guilford, Consequences: Manual for Administration, Scoring and Interpretation, Second Edition, Beverley Hills, Sheridan Supply Co., 24 p.

remote. The obvious score offers another measure of the factor Ideational Fluency and the remote score provides the measure of the factor Originality.¹⁴ The actual administration of the instruments will be discussed now.

3. Testing Procedure.

With information pertaining to the sample population and psychometric instruments having been given, the object of this section is to convey a description of the operations followed in collecting the data required to test the hypotheses advanced earlier. It is hoped that an account of the mechanics involved will facilitate a mental reconstruction of the actual procedure.

Persons meeting the criteria elaborated in Section One of this chapter were tested weekly at the same time in small (five or less) mixed groups. Testing was carried out in a dining room having ten "tables for four" which served as desks. One subject was seated at each table. The room was adequately lighted and ventilated and the tables were sufficiently spaced to prevent copying and minimize distraction because of physical proximity. The seating arrangement also enabled the examiner to move about the room freely. All testing was conducted by the writer.

¹⁴ Ibid., p. 1.

At least two features of the procedure thus far detracted from the unfamiliarity of the testing situation. First, the researcher had met each subject personally prior to this and, second, the dining rooms were of a standard design which did not permit too much deviation in terms of physical appearance. Also, each subject was informed about this testing by the investigator several days in advance so that he or she was just not summoned to appear at a certain place at a certain time.

After the group had been assembled a brief greeting was given, as well as a restatement of the conditions of participation, namely, confidentiality, freedom to leave before any further testing was begun and the independence of their participation from either progress in the hospital or discharge. At this point the subjects were told how long the testing would take and were then encouraged to do the best they could on the tests.

The first test was then distributed face down and each subject was requested to write his or her name on the back of the test booklet. At the examiner's signal the subjects turned over the test booklet and, as they read the directions to themselves, the examiner read them aloud. After a reasonable pause and call for questions the subjects were instructed to proceed with the test and stopped when time had expired. The order in which the actual testing was conducted is the same as

in order in which the various tests appear in Appendix 2. The Inclusion Test was administered last. Testing lasted for approximately seventy minutes including the introductory and closing comments of the examiner.

Every other group was retested four days later for the purpose of establishing an alternate-form reliability measure for the divergent-thinking tests and a retest reliability measure for the Inclusion Test. At the time of retesting the procedure was essentially the same, except that the order of test presentation was reversed in an attempt to control the influence of fatigue upon test performance. Further, with regard to reliability, it was necessary to obtain a measure of interscorer reliability for the Consequences test which permits more subjective bias than the scoring of the other tests in the battery.¹⁵ In order to do this both protocols of each subject were scored by another person in addition to the investigator.

The detailed plan for the major statistical treatment called for the subjects to be divided into equal groups according to degree of overinclusion. The classification was accomplished by first ranking the scores and then dividing the subjects into three groups of twenty-five. Persons receiving the highest twenty-five scores constituted the High overinclusive group, the next highest twenty-five persons constituted the Middle group and the lowest twenty-five persons constituted

¹⁵ Ibid., p. 6.

the low group. The analysis of the scores derived from the tests used and determination of the reliability coefficients proceeded according to the statistical techniques presented in the next section.

4. Statistical Procedure.

This section is devoted to a presentation of the statistical techniques chosen to treat the raw data collected. In order to test the first hypothesis Pearson product moment correlation coefficients were obtained between the Inclusion Test scores and the scores derived from the tests of divergent thinking. The following formula was employed:¹⁶

$$r^2 = \frac{[N\sum XY - (\sum X)(\sum Y)]^2}{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}$$

The second statistical hypothesis was evaluated by computing t tests of significance among the differences between the correlations obtained between the Inclusion Test scores and the divergent-thinking test scores. The formula for assessing the significance of a difference between two correlation coefficients was:¹⁷

¹⁶ J.P. Guilford, Fundamental Statistics in Psychology and Education, New York, McGraw-Hill, 1956, p. 141.

¹⁷ Quinn McNemar, Psychological Statistics, 3rd Edition, New York, Wiley, 1962, p. 140.

$$t = \frac{(r_{12} - r_{13}) \sqrt{(N-3)(1-r_{23})}}{\sqrt{2(1-r_{12}^2-r_{13}^2-r_{23}^2+2r_{12}r_{13}r_{23})}}$$

where $N = 7$

r_{12} = correlation coefficient between Inclusion Test scores and scores on one divergent-thinking test.

r_{13} = correlation coefficient between Inclusion Test scores and scores on another divergent-thinking test.

and r_{23} = intercorrelation between the two divergent-thinking tests being compared.

The intercorrelations required for this formula were computed according to the formula presented above.

The third statistical hypothesis was evaluated using a t test of the difference between the group means for each divergent-thinking test, taken two at a time. This was accomplished according to the formula:¹⁸

$$t = \frac{\bar{M}_1 - \bar{M}_2}{\sqrt{\frac{\sum x_1^2 + \sum x_2^2}{N_1(N_1-1)}}$$

where $\sum x_1^2$ and $\sum x_2^2$ = sums of squares in the two samples
and N_1 = size of either sample.

In order to assess the possible influence of intelligence and age upon the dependent variables, a multiple correlation coefficient was computed according to the formula:¹⁹

¹⁸ Guilford, Op. Cit., p. 220.

¹⁹ Ibid., p. 393.

$$r_{1.23}^2 = \frac{r_{12}^2 r_{13}^2 + 2r_{12}r_{13}r_{23}}{1 - r_{23}^2}$$

where r_{12} = correlation coefficient between test scores and estimated intelligence
 r_{13} = correlation coefficient between test scores and age
 r_{23} = correlation coefficient between age and estimated intelligence

Independently from the general statistical treatment of the raw data it was necessary to establish a retest reliability coefficient for the Inclusion Test scores, alternate forms reliability coefficients for the scores derived from the tests of divergent thinking and interscorer reliability for the Consequences Test. Reliability for the Inclusion Test was established according to the formula for a product moment coefficient of correlation which has been presented above.

The alternate forms reliability coefficient was computed according to the formula:²⁰

$$r_{tt} = 1 - \frac{\sigma_d^2}{\sigma_t^2}$$

where d = difference between two half scores,
 σ_d = standard deviation of those scores,
 and σ_t = standard deviation of the total scores.

²⁰ Ibid., p. 452.

The total test reliability was computed by then substituting in the formula:²¹

$$r_{nn} = \frac{nr_{11}}{1 + (n-1)r_{11}}$$

where r_{11} = the obtained alternate forms coefficient
and n = 2²²

Interscorer reliability for the Consequences Test was computed according to the formula:²³

$$r_{cc} = \frac{r_{x'_1 x'_2} + r_{x''_1 x''_2}}{\sqrt{r_{x'_1 x'_1} r_{x'_2 x'_2} + r_{x''_1 x''_1} r_{x''_2 x''_2}}}$$

where x' and x'' = scores on two forms of the test
and 12 = two scorers.

The next chapter will convey the findings obtained following the various statistical treatments which have been presented in this section. In an attempt to achieve clarity of presentation, the discussion will be facilitated by summary tables as needed.

²¹ J.P. Guilford, Psychometric Methods, New York, McGraw-Hill, 1954, p. 379.

²² Except for the test Alternate Uses where $n = 3$.

²³ Guilford, Psychometric Methods, p. 394.

Interscorer reliability for the Consequences test was computed according to the formula:²³

$$r_{cc} = \frac{r_{x'_1 x''_2}}{\sqrt{r_{x'_1 x'_2} r_{x''_1 x''_2}}}$$

where x' and x'' = scores on two forms of the test
and 12 = two scorers.

The next chapter will convey the findings obtained following the various statistical treatments which have been presented in this section. In an attempt to achieve clarity of presentation, the discussion will be facilitated by summary tables as needed.

23 Guilford, Psychometric Methods, p. 394.

CHAPTER III

PRESENTATION AND DISCUSSION OF RESULTS

In light of the discourse thus far, the appropriate purpose of this chapter is to convey, in an organized and meaningful manner, the results of the study. In order to meet this objective, the chapter will be divided into sections. Section One will consist mainly of a summary presentation of the results with relevant explanatory comments. Section Two will stress interpretation, considering the design and theoretical foundations of the research. Suggestions for further research will also be included in this chapter.

1. Presentation of Results.

As mentioned in Chapter Two, three groups of twenty-five subjects were formed on the basis of their scores on the Inclusion Test, since previous research indicated that over-inclusion approximated some kind of continuum. The raw scores obtained on the Inclusion Test and tests of divergent thinking can be found in Appendix 3. Table I on the next page presents a summary of the descriptive statistics for the three groups. It can be seen that the groups are essentially the same with respect to mean age and education, but differ significantly in terms of verbal intelligence ($t = 2.23$). In terms of sex, the High group had fourteen men and eleven women, the Middle

Table I.-

Descriptive Statistics for Three Groups of Subjects
Differentiated by Scores on the Inclusion Test.

Group (N=25)	Statistic	Age	Education	Estimated Verbal I.Q.
High	M	38.88	11.64	105.84
	σ	7.39	.85	18.26
	σ_m	1.51	.17	3.72
Middle	M	37.06	11.80	106.24
	σ	8.56	1.81	8.60
	σ_m	1.75	.37	1.77
Low	M	35.64	12.76	117.44
	σ	7.56	2.25	16.09
	σ_m	1.54	.45	3.69

group eleven men and fourteen women and the Low group eight men and seventeen women. From the standpoint of diagnostic classification several subtypes were represented in each group. The High group had seven chronic schizophrenic individuals, eleven acute schizophrenic individuals, one catatonic schizophrenic person and six paranoid schizophrenic individuals; the Middle group had six chronic schizophrenic persons, seven acute schizophrenic individuals, five simple schizophrenic persons, three schizo-affective persons and four paranoid schizophrenic persons; the Low group had nine chronic schizophrenic persons, ten acute schizophrenic persons, five paranoid schizophrenic individuals and one schizo-affective individual.

Table II on the next page presents the correlations obtained between the Inclusion Test scores and the divergent-thinking test scores. Significant correlations were found between the Inclusion Test scores and scores obtained on Word Fluency and Alternate Uses. Thus, the first statistical hypothesis of no significant relationships between over-inclusion and divergent thinking was rejected.

Furthermore, the significant t values obtained indicated that overinclusion was related more to certain divergent-thinking abilities than to others. That is, Inclusion Test scores correlated significantly more with Word Fluency and Alternate Uses when compared with the correlation obtained

Table II.-

Correlations between Inclusion Test Scores and Scores on Seven Tests of Divergent Thinking, Differences between Correlations and Significant t Values, Derived from the Total Sample.^{a, b}

Tests	Differences				
	Sample	Word Fluency	Alt. Uses	Ident. Fluency	Exp. Fluency
	.28	.34	.39	.41	.19
Obvious					
.14	.12	.31	.31	.14	.15
					($r = .16$)
Remote					
.20		.14	.12	.02	.01
Word Fluency					
.34			.05	.10	.25
Alt. Uses					
.39				.21	.26
				($r = .11$)	.10
Ident. Fluency					
.15					.01
Exp. Fluency					
.19					.02

^a Significant correlation at $p < .01 = .23$, $p < .1 = .34$.

^b Significant t at $p < .01 = 2.95$, $p < .05 = 2.04$.

between Inclusion Test scores and Obvious scores. Also, Inclusion Test scores correlated significantly more with Alternate Uses when compared with Ideational Fluency and Expressional Fluency. On the basis of the obtained results the second statistical hypothesis of no significant differences among the relationships between overinclusion and divergent-thinking abilities was rejected.

The third statistical hypothesis of no significant differences in divergent-thinking abilities among groups of schizophrenic individuals classified as low, middle and high scorers on a test of overinclusion was accepted on the basis of the results presented in Table III on the next page. However, inspection of the table also indicates that one significant difference, between the High and Low groups, was obtained among the twenty-one possible differences. The fact that other differences were not demonstrated does not mean that there are in fact no differences, but rather that if other differences do exist among the groups they are not large enough to be demonstrated by the size of the samples used. The next section is intended to embellish the statistical information which has been presented.

PRESENTATION AND DISCUSSION OF RESULTS

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Table III.-

Data for t Tests of Significance Among Three Groups for Seven Tests of Divergent Thinking.^{a, b}

Groups (N=25)	Stat.	Obvious	Remote	Word Fluency	Alt. Uses	Ideat. Fluency	Exp. Fluency	Assoc. Fluency
High	M	13.16	3.92	13.56	2.52	15.20	2.06	4.66
Middle	M	10.60	3.56	14.60	3.00	14.08	2.04	6.00
	MD	2.48	.36	1.32	.48	1.12	.04	1.40
	OD	4.03	1.76	4.22	1.09	4.61	.76	1.77
	t	.61	.21	.31	.45	.25	.00	.70
Low	M	12.32	6.68	18.72	2.80	15.32	3.40	6.52
Middle	M	10.60	3.56	14.60	3.00	14.08	2.04	6.00
	MD	1.64	3.12	3.54	2.08	5.24	1.36	.44
	OD	3.91	1.12	5.16	1.50	5.23	.98	1.97
	t	.42	1.57	.74	1.62	1.11	1.36	.22
High	M	13.16	3.92	13.56	2.52	15.20	2.06	4.66
Low	M	12.32	6.68	18.72	2.80	19.32	3.40	6.52
	MD	.84	2.76	5.16	3.36	4.12	1.32	1.84
	OD	4.43	2.25	4.99	1.09	5.17	.95	1.05
	t	.19	1.22	1.04	3.06	.79	1.39	.79

a df = 1 and 48.

b Significant t values = 2.69 at p = .01.

2. Discussion of Results.

Before undertaking a discussion of the results which have been presented it may be helpful to restate some of the essential findings regarding overinclusion. Overinclusion has been found to be associated with impaired concept formation. This disturbance, according to the literature pertaining to Interference Theory, disrupts what is generally called deductive reasoning. This has usually been demonstrated with reference to problem solving tasks where overinclusive schizophrenic persons have usually displayed marked flexibility, and an excessive number of responses to particular situations, many of which are peculiar, remote associations which impair efforts to solve problems demanding comprehension and understanding.

This general description of schizophrenic persons' thinking who form overinclusive concepts comes closest to the factor abilities called Adaptive Flexibility and Semantic Spontaneous Flexibility. However, the other abilities in the divergent-thinking category also emphasize production and variety, but there has been no association in the literature between overinclusion and thinking abilities such as these. The inference of creative thinking possibly being associated with overinclusion has been made only in terms of the two abilities mentioned above.

From the results which have been presented, it can first be said that overinclusion is related to at least one other aspect of creative thinking which have not been discussed in the literature. More specifically, overinclusion has been found to be related to Word Fluency, i.e., the ability to produce rapidly words fulfilling specified symbolic requirements. In keeping with the general theoretical findings overinclusion was found to be positively related to Semantic Spontaneous Flexibility, i.e., the ability or disposition to produce a diversity of ideas when asked to do so. It has also been shown that a low degree of overinclusion is associated with a higher level of the latter ability. It can be seen from Table IV that the significant multiple correlation obtained with Semantic Spontaneous Flexibility suggests that the combined influence of age and intelligence may be related to a high level of this ability since the Low group was more intelligent, at least in terms of the measure used in this study.

Since no other significant differences in level of ability were found among the groups classified according to degree of overinclusion, no further theoretical interpretations can be made along these lines with any certainty. It can be seen from the results presented, however, that trends are usually consistent with those interpretations based upon an acceptable level of statistical confidence.

Table IV.-

Coefficients of Correlation Between Test Performance, Age and Estimated Verbal Intelligence, and Multiple Correlations for the Total Sample.^{a,b}

Test	Coefficient of Correlation			
	r_{12}	r_{13}	r_{23}	$R_{1.23}$
Obvious	.12	.08		.12
Remote	.65	.23		.22
Word Fluency	.03	.07		.09
Alternate Uses	.49	.04		.53
Ideational Fluency	.12	.57		.64
Expressional Fluency	.05	.01		.07
Associational Fluency	.50	.10		.62
			.62	

^a Where subscript 1 denotes test performance, 2 denotes estimated verbal intelligence and 3 denotes age.

^b Based on a random sample of the total sample, $N = 30$.

Of the abilities studied, Semantic Spontaneous Flexibility stands out as having more relationship with overinclusion than any other ability. This finding is consistent with the general observation that overinclusive schizophrenic individuals incorporate many ideas into their problem solving which may be irrelevant when a specific response is required. Surprisingly, Adaptive Flexibility, or the disposition to produce uncommon, remotely associated or clever responses was not associated with overinclusion more significantly than other abilities. Descriptions of overinclusive schizophrenic individuals' problem solving frequently include references to terms similar to those which define this ability in the Structure-of-Intellect Model. It is possible that the factor abilities studied here provide a clearer distinction of the atypical problem solving efforts. At this point it can be mentioned that the reliability coefficients reported in Table V on the following page are sufficiently high to rule out inconsistency of test performance and scoring as possible sources of error.

The findings of this investigation are not entirely consistent with those reported by Al-Issa and Robertson¹ inasmuch as positive relationships between overinclusion,

¹ Ihsan Al-Issa and James Patrick G. Robertson, "Divergent Thinking Abilities in Chronic Schizophrenia", Journal of Clinical Psychology, Vol. 20, No. 4, 1964, p. 433-435.

to further interpret the differences among the various abilities in terms of Interference Theory with any certainty.

The unexpected failure of the study to demonstrate relationships between overinclusion and divergent thinking could have possibly been the result of the inadequacy of the tools of the experiment. Evidence has been reported in Chapter Two to warrant the conclusion that the tests of divergent thinking are both valid and reliable. The reliability coefficients reported in Table V on the following page are sufficiently high to rule out inconsistency of performance and scoring on these tests. Similarly, the retest reliability coefficient for the Inclusion Test is of an acceptable magnitude to conclude that overinclusion was assessed reliably.

The validity of the Inclusion Test as a measure of overinclusion has been questioned, as was mentioned in chapter two.² The writer is therefore inclined to reiterate the contention advanced earlier, namely, the criticism is essentially one pertaining to the construct validity of the instrument and the author offers as an alternative another instrument, the validity of which is still of the rational variety. More research is needed to demonstrate not only the superiority of the newer instrument but also the accuracy of the theoretical modifications which the author sets forth.

² Israel Eli Sturm, "Overinclusion and Concreteness Among Pathological Groups", Journal of Consulting Psychology, Vol. 29, No. 1, p. 9-18.

an aspect of thought disorder, and divergent-thinking abilities were found. However, the finding that persons exhibiting a high degree of overinclusion demonstrates a low level of Semantic Spontaneous Flexibility is consistent with their report. The relationship between certain divergent-thinking abilities and intelligence is also consistent, although the age range of the subjects was somewhat different.²

The expectations of the writer based upon his interpretation of Interference Theory, i.e., of a direct relationship between overinclusion and creative thinking defined in terms of divergent-thinking abilities were not completely confirmed. Several studies have already been cited which present evidence of the possible relationship between overinclusion and creative thinking. Cameron also implies a certain cognitive flexibility in his discussion of the phenomenon of overinclusion. It is quite possible that what is reported in the literature pertaining to overinclusion is an elusive concept when compared with creativity defined in terms of divergent-thinking factors. The findings clearly suggest that caution must be exercised in making the inference of creative thinking from a schizophrenic individual's unusual, peculiar and remote associations to certain situations.

² Ihsan Al-Issa, "Creativity and Its Relationship to Age, Vocabulary, and Personality of Schizophrenics", British Journal of Psychiatry, Vol. 110, 1964, p. 74-78.

Certainly when given the opportunity to think creatively in this study the most overinclusive schizophrenic individuals did no better than subjects who manifested less of this tendency. The inference cannot be made indiscriminately, but rather in terms of degree of overinclusion and with reference to specific abilities. The fact that overinclusion has been described as an unstable phenomenon was not a contaminating influence if the reliability of the Inclusion Test is accepted.

The validity of the Inclusion Test as a measure of overinclusion has been questioned, as was mentioned in Chapter Two.³ The writer is inclined to reiterate the contention advanced earlier, namely, the criticism is essentially pertaining to the construct validity of the instrument and the author offers as an alternative another instrument, the validity of which is still of the rational variety. More research is needed to demonstrate not only the superiority of the newer instrument, but also the accuracy of the theoretical modifications which the author sets forth.

From the standpoint of sampling, questions as to the representativeness of the sample, the sampling technique and the size of the sample can be raised. From the information

³ Israel Eli Sturm, "Overinclusion and Concreteness Among Pathological Groups", Journal of Consulting Psychology, Vol. 29, No. 1, p. 9-15.

presented in Chapter Two, the writer is compelled to conclude that the sample population used in the study had many comparable features with the universe of hospitalized schizophrenic persons. The source of the subjects was essentially the same as other sources within the state where the research was carried out with respect to admission rate, number and type of schizophrenic persons in hospital residence. Restrictions imposed in terms of intelligence and age undoubtedly detracted somewhat from the representativeness, but because of the instruments used these were reasoned to be necessary and their influence evaluated.

The question of diagnosis is legitimately debatable, but whether the subjects of the study were classified as schizophrenic or anything else is really a distracting issue inasmuch as overinclusion has been found to be a phenomenon common to other "groups" of people as well. Similarly, Guilford's Structure-of-Intellect concept is a universal one cuts across the impediments of various types of classification. The diagnostic procedure itself may have some weaknesses in terms of validity and reliability, but is probably a close approximation to the conventional system employed in settings where schizophrenic persons have been research subjects.

SUMMARY AND CONCLUSIONS

This paper reported an investigation intended to explore possible relationships between overinclusion and divergent thinking. The problem was set forth in the context of an Interference Theory of conceptual deficit, which was reviewed according to research pertaining to the theory.

Following a pertinent review of the literature certain conclusions and positions of the writer were stated in a hypothetical manner. Three statistical hypotheses were formulated. First, there are no significant relationships between overinclusion and divergent-thinking abilities. Second, there are no significant differences among the relationships between overinclusion and divergent-thinking abilities. Third, there are no significant differences in divergent-thinking abilities among groups of schizophrenic individuals classified as low, middle and higher scorers on a test of overinclusion.

After these statements the design of the experiment was presented in detail with respect to sampling, testing and statistical procedures followed. The strengths and weaknesses of this aspect of the study were acknowledged.

The results of the experiment were then reported. The first and second statistical hypotheses were rejected, but the third was not. Thus although relationships were found

between overinclusion and divergent thinking the full meaning of the results could not be accurately and completely evaluated since only one significant difference in divergent-thinking ability was found among the groups of subjects.

In an attempt to assess the unexpected findings, an examination of the investigation was carried out with reference to the theoretical foundations and design of the experiment.

The fact that this study did not demonstrate statistically significant differences in divergent-thinking abilities among groups of schizophrenic individuals at different degrees of overinclusion cannot be taken to mean that there are in fact no differences. The reliability and validity of the tools were defended. Also, positive relationships between overinclusion and certain divergent-thinking abilities and significantly greater relationships with certain abilities when compared with others suggested that overinclusion may be related to abilities other than those usually cited in the literature. It is possible that what has been reported in the literature pertaining to the creative thinking of overinclusive schizophrenics is restricted to only certain factors of divergent production and to certain degrees of overinclusion.

It therefore seems to the writer that other attempts should be made to test this hypothesis by including, as measures of the criterion, not only divergent-thinking tests but more traditional ones as well. The inference of creativity

based upon deviant performance on tasks not constructed to assess creative thinking seems to the writer to be an oblique one in the sense that creativity has been posited on the basis of failures of subjects to reach conventional and appropriate solutions to standard problems. Further research will be needed to clarify the possible relationships as well as the construct of overinclusion, both theoretically and psychometrically.

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Al-Issa, Ishan and James Patrick S. Robertson, "Divergent Thinking Abilities in Chronic Schizophrenia", Journal of Clinical Psychology, Vol. 20, No. 4, 1964, p. 433-435.

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Sturm, Israel M., "Overinclusion and Concreteness Among Pathological Groups", Journal of Consulting Psychology, Vol. 29, No. 1, p. 3-10.

A review of studies using the Inclusion Test and presentation of a revised form which is intended to be a more accurate assessment of the phenomenon.

APPENDIX 1

TEST OF OVERINCLUSION

EPSTEIN TEST

EPSTEIN TEST

Name: _____ Date: _____

Age: _____ Sex: _____ Education: _____

In the test below, the first word is printed in capital letters. Opposite it are five other words and the word "none". Draw a line under all of the words that are absolutely necessary to make a complete thing that the first word describes. If none of them is a necessary part, underline only the word "none". Remember to underline only what is absolutely necessary to have a complete thing; not what only improves or often goes together with the thing. If you change your mind about a choice, erase the line under that choice completely.

Below is a sample which has been worked for you, and three other examples for you to practice on. When you are through with these examples, ask the examiner to check them to see if they are correct before you go on to the test itself, which begins on the next page.

HOUSE	<u>walls</u>	curtains	telephone	bricks	<u>roof</u>	none
HOUSE-FLY	wings	mouth	feet	fly-paper	germs	none
CAT	beard	whiskers	milk	kitten	mouse	none
TOOTH	brush	filling	gold	teeth	dentist	none

If you have any questions, ask the examiner now, as he will not answer any once you have turned the page and started to work on the test.

1. MAN	arms	shoes	hat	toes	head	none
2. AUTOMOBILE	wheels	driver	radio	head-light	bumper	none
3. SEX	male	sin	love	marriage	female	none
4. ESKIMO	ice	blubber	human	sled	igloo	none
5. LOCK	key	key-hole	door	locker	safe	none
6. CANDLE	fire	wax	wicked	kandle	light	none
7. IMPRISONMENT	bars	restriction	police	criminal	loneliness	none
8. BOX	wood	shape	nails	width	corners	none
9. SPARROW	feathers	feet	William	Bill	teeth	none
10. PAINT	painter	brush	liquid	terpenzine	red	none
11. FISHERMAN	worm	trout	pole	fins	heart	none
12. PHOTOGRAPHY	art	camera	topography	filmature	snap-pin	none
13. CHAIR	table	cushion	wood	paint	seat	none
14. ROYBLE	stately	harsh	cheese	noble	fable	none
15. HOLE	weight	whole	space	air	doughnut	none
16. TOOL	carpenter	hammer	handle	work-nack	tool	none
17. MANICRON	science	time	insect	gyroscope	metal	none
18. BLOOD	death	celloplasm	horror	liquid	bandage	none
19. ANIMAL	lion	fur	tail	creature	zoo	none
20. SOUNTONIFIC	loud	soft	sound	secret	music	none
21. AFTER	late	before	time	after	after	none
22. SHOE	laces	socks	buckles	leather	sole	none
23. YES	no	maybe	yes	no	yes	none
24. RELIGION	heaven	faith	heel	soul	belief	none
25. UNHAPPINESS	myself	everyone	sinner	sadness	tears	none
26. TOPITCH	insect	disease	royble	scratch	topic	none
27. LOCOMOTIVE	steam	motor	electricity	engine	engineer	none
28. TREE	oak	wood	roots	growl	bark	none
29. LOVE	hate	feeling	kisses	marriage	sex	none

30. HORSE	hoofs	saddle	horse-shoe	reins	farm	none
31. PARTY	enjoyment	birthday	celebration	people	festival	none
32. BOAT	cars	motor	ship	sail	water	none
33. SPEECH	sound	audience	words	writing	language	none
34. CIGARETTE	tabacco	smoke	fire	paper	Camels	none
35. HEART	blood	valentine	hearth	love	flesh	none
36. CLIMATE	rain	weather	barometer	moon	wind	none
37. APPLE	seed	fruit	tree	orchard	peel	none
38. RUSSIAN	communist	green	red	person	villain	none
39. SERLEDICT	creed	derelict	edict	savage	Tibetan,	none
40. WORD	meaning	sentence	eipword	symbol	sound	none
41. EAR	head	hearing	lobe	sound	hole	none
42. FARM	cows	vegetables	horses	land	plow	none
43. WAGON	wood	horse	wheels	wood	driver	none
44. WHISTLING	tune	air	sound	music	whistle	none
45. NEWS	paper	event	radio	commentator	views	none
46. BIRD	canary	song	feathers	flight	cage	none
47. BALL	bat	roundness	base	object	football	none
48. DIAMOND	ring	rock	stone	engagement	money	none
49. BLOTTER	sponge	bladder	ink	paper	absorption	none
50. ALPHABET	numbers	postcards	stamps	letters	grammer	none

APPENDIX 2

SIX TESTS OF DIVERGENT THINKING

APPENDIX 2

ASSOCIATIONAL FLUENCY

Form "A"

By Paul R. Christensen and J.P. Guilford

NAME _____ SEX: M _____ F _____ SCORES: 1 _____
GROUP _____ DATE _____ Total _____

In this test you are to write words similar in meaning to the given word.

SAMPLE ITEM:

Write words similar in meaning to the word hard.

HARD:

difficult severe
solid stiff
tough
stiff

Notice that the words written above are all similar in meaning to the word **HARD** in meaning. In the test you are to write as many words as you can that are similar in meaning to the given word.

WAIT FOR THE SIGNAL. REPEAT FRONT OF THE PAGE

Write as rapidly as you can. Avoid using words like the given word. Your score will be the total number of words you write that are similar in meaning to the given word.

There are two parts to this test. You will have 8 minutes for each part.

Are there any questions?

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART 1

a. CALM:

1. The first step in the process of determining the cause of a problem is to identify the problem itself. This is often done by asking the question, "What is the problem?"	2. The second step is to gather information about the problem. This can be done by talking to people who are involved in the problem, by looking at data, or by conducting experiments.
3. The third step is to analyze the information that has been gathered. This involves looking for patterns, making hypotheses, and testing them.	4. The fourth step is to develop a solution. This is often done by brainstorming ideas and then choosing the one that seems most promising.
5. The fifth step is to implement the solution. This involves putting the solution into action and monitoring its progress.	6. The sixth step is to evaluate the results. This involves comparing the results of the solution to the original problem and determining whether the problem has been solved.
7. The seventh step is to communicate the results. This involves sharing the results of the solution with others who may be interested in the problem.	8. The eighth step is to reflect on the process. This involves thinking about what was learned from the process and how it can be applied to other problems.
9. The ninth step is to document the process. This involves writing down the steps that were taken and the results that were achieved.	10. The tenth step is to review the process. This involves looking back at the process and seeing if there are any areas that could be improved.

b. FOUL:

1. The first step in the process of determining the cause of a problem is to identify the problem itself. This is often done by asking the question, "What is the problem?"	2. The second step is to gather information about the problem. This can be done by talking to people who are involved in the problem, by looking at data, or by conducting experiments.
3. The third step is to analyze the information that has been gathered. This involves looking for patterns, making hypotheses, and testing them.	4. The fourth step is to develop a solution. This is often done by brainstorming ideas and then choosing the one that seems most promising.
5. The fifth step is to implement the solution. This involves putting the solution into action and monitoring its progress.	6. The sixth step is to evaluate the results. This involves comparing the results of the solution to the original problem and determining whether the problem has been solved.
7. The seventh step is to communicate the results. This involves sharing the results of the solution with others who may be interested in the problem.	8. The eighth step is to reflect on the process. This involves thinking about what was learned from the process and how it can be applied to other problems.
9. The ninth step is to document the process. This involves writing down the steps that were taken and the results that were achieved.	10. The tenth step is to review the process. This involves looking back at the process and seeing if there are any areas that could be improved.

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

APPENDIX 2
PART II

66

a. POSITIVE:

THESE ARE THE RESULTS OF THE TESTS CONDUCTED ON THE SAMPLES OF THE
SUBSTANCE WHICH WAS SUBMITTED TO THE LABORATORY FOR ANALYSIS. THE
ANALYSIS WAS CONDUCTED IN ACCORDANCE WITH THE STANDARD METHODS
FOR THE ANALYSIS OF THIS TYPE OF SUBSTANCE. THE RESULTS OF THE
ANALYSIS ARE AS FOLLOWS: THE SAMPLES WERE FOUND TO CONTAIN
THE FOLLOWING ELEMENTS: CARBON, HYDROGEN, OXYGEN, NITROGEN, AND
SULFUR. THE PERCENTAGE OF EACH ELEMENT IS AS FOLLOWS: CARBON
65.0%, HYDROGEN 8.0%, OXYGEN 12.0%, NITROGEN 10.0%, AND SULFUR
5.0%. THESE RESULTS ARE IN AGREEMENT WITH THE RESULTS OF THE
ANALYSIS CONDUCTED ON THE SAMPLES OF THE SUBSTANCE WHICH WAS
SUBMITTED TO THE LABORATORY FOR ANALYSIS. THE ANALYSIS WAS
CONDUCTED IN ACCORDANCE WITH THE STANDARD METHODS FOR THE
ANALYSIS OF THIS TYPE OF SUBSTANCE. THE RESULTS OF THE ANALYSIS
ARE AS FOLLOWS: THE SAMPLES WERE FOUND TO CONTAIN THE FOLLOWING
ELEMENTS: CARBON, HYDROGEN, OXYGEN, NITROGEN, AND SULFUR. THE
PERCENTAGE OF EACH ELEMENT IS AS FOLLOWS: CARBON 65.0%,
HYDROGEN 8.0%, OXYGEN 12.0%, NITROGEN 10.0%, AND SULFUR 5.0%.

b. FAIR:

THESE ARE THE RESULTS OF THE TESTS CONDUCTED ON THE SAMPLES OF THE
SUBSTANCE WHICH WAS SUBMITTED TO THE LABORATORY FOR ANALYSIS. THE
ANALYSIS WAS CONDUCTED IN ACCORDANCE WITH THE STANDARD METHODS
FOR THE ANALYSIS OF THIS TYPE OF SUBSTANCE. THE RESULTS OF THE
ANALYSIS ARE AS FOLLOWS: THE SAMPLES WERE FOUND TO CONTAIN
THE FOLLOWING ELEMENTS: CARBON, HYDROGEN, OXYGEN, NITROGEN, AND
SULFUR. THE PERCENTAGE OF EACH ELEMENT IS AS FOLLOWS: CARBON
65.0%, HYDROGEN 8.0%, OXYGEN 12.0%, NITROGEN 10.0%, AND SULFUR
5.0%. THESE RESULTS ARE IN AGREEMENT WITH THE RESULTS OF THE
ANALYSIS CONDUCTED ON THE SAMPLES OF THE SUBSTANCE WHICH WAS
SUBMITTED TO THE LABORATORY FOR ANALYSIS. THE ANALYSIS WAS
CONDUCTED IN ACCORDANCE WITH THE STANDARD METHODS FOR THE
ANALYSIS OF THIS TYPE OF SUBSTANCE. THE RESULTS OF THE ANALYSIS
ARE AS FOLLOWS: THE SAMPLES WERE FOUND TO CONTAIN THE FOLLOWING
ELEMENTS: CARBON, HYDROGEN, OXYGEN, NITROGEN, AND SULFUR. THE
PERCENTAGE OF EACH ELEMENT IS AS FOLLOWS: CARBON 65.0%,
HYDROGEN 8.0%, OXYGEN 12.0%, NITROGEN 10.0%, AND SULFUR 5.0%.

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

LEARNING FLUENCY

FORM A

By Paul R. Christensen and J.P. Guilford

NAME	M				
(Print)	SEX	AGE			
Last	First	Middle	F		
GROUP	DATE	Total			

In this test you are to write sentences each made up of four words. Each word must begin with the letter indicated.

SAMPLE ITEM:

K *keep* *up* *the* *best* *of* *the* *team*
 K *kill* *the* *enemy* *in* *the* *field*
 K *kidnap* *the* *prisoner* *and* *take* *him* *to* *the* *city*
 K *kill* *the* *enemy* *in* *the* *field*

The task in this test is to write words that begin with the given letter. The test contains four parts. Each part contains as many four-word sentences as possible, using the given letters.

WAIT FOR THE SIGNAL TO BEGIN THE TEST.

All sentences must be written using the same word twice. You may use the same word in the same sentence you write in the first part.

There are four parts to this test. Write four sentences for each part. Are there any questions?

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART 1

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

L c e n

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART 11

F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p
F	o	a	p

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

PART III

B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d
B	t	h	d

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART IV

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

M a r e

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

APPENDIX 2

IDENTIFICATION TEST

74

Form "A"

By Paul R. Christensen and J.P. Guilford

NAME _____ SEX: M _____ F _____
 GROUP _____ DATE _____
 Total _____

In this test you are to name things that belong to certain classes.

SAMPLE ITEM:

Name FLUIDS that will
 BURN.

Handwritten list of items:
 gasoline, kerosene, oil, alcohol, acetone, benzene, turpentine, paint thinner, etc.

In this sample item, the class is "fluids that will burn." Four such fluids have been listed for you. Of course, there are many other fluids that will burn.

For this test, a fluid is any non-living thing that is a liquid or gas. A solid is any non-living thing that is not a liquid or gas.

The items in this test will be somewhat like the sample item above. Your task will be to write as many things as you can that belong to certain classes. If you are not certain whether a thing fits the class, write it down anyway and try to think of another suitable thing.

WAIT FOR THE SIGNAL BEFORE TURNING THIS PAGE.

There will be four parts to this test. You will have 3 minutes per part. Are there any questions?

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART I

Name FLUIDS that are suitable for
DRINKING

Acceptable - milk

Not acceptable - ether

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART II

Name SOLIDS that
FLOAT on water.

Acceptable - a cork
Not acceptable - oil

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART III

Name ARTICLES of CLOTHING

Acceptable - coat

Not acceptable - spectacles

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

7.

Acceptable - sugar
Not acceptable - flour

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

APPENDIX 2
CONSEQUENCES

79

By P.R. Christenson, P.R. Herrifield, and L.S. Gustafson

NAME _____ SEX: _____
GROUP _____

This is a test of your ability to think of a large number of ideas in connection with a new and unusual situation.

Look at a sample item.

SAMPLE ITEM:

What would be the results if people no longer needed or wanted sleep?

SAMPLE RESULTS:

1. Get more work done
2. Alarm clocks not necessary
3. No need for bunk beds in barracks
4. Sleeping pills will be given away
5. _____
6. _____

Of course, there are many more possible results that could have been written.

There will be 10 different situations somewhat like the one above, each one on a separate page. Four examples will be included for each item. You will be given two minutes on each page to write down other possible results. Write as many different consequences or possible results of the change as you can. Your answers need not be complete sentences. Your score will be the total number of different consequences that you write in the time given you.

Are there any questions?

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

LIST AS MANY DIFFERENT
CONSEQUENCES AS YOU CAN.

I

What would be the results if there was no need for food or more food?

- a. No need for farmers
- b. No plates, knives, and forks
- c. No grocers
- d. Save time

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
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18. _____
19. _____
20. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

LIST AS MANY DIFFERENT
CONSEQUENCES AS YOU CAN.

IT

What would be the results if humans lost their group feeling to the extent that they all preferred to live alone?

- a. No more marriages
- b. Population decline
- c. More hermits
- d. No more cities

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
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17. _____
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19. _____
20. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

LIST 10 MAY 1951
CONT'D. (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)

What would be the results if the above listed items were not taken care of?

- a. Starvation & death
- b. People would move East
- c. Food shortages
- d. There would die

1. ...
2. ...
3. ...
4. ...
5. ...
6. ...
7. ...
8. ...
9. ...
10. ...
11. ...
12. ...
13. ...
14. ...
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17. ...
18. ...
19. ...
20. ...

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

What would you do if you saw a person who was acting suspiciously in a public place?

- a. People should call the police
- b. Could not walk
- c. Not good idea
- d. Confusion

1. [Illegible text]
2. [Illegible text]
3. [Illegible text]
4. [Illegible text]
5. [Illegible text]
6. [Illegible text]
7. [Illegible text]
8. [Illegible text]
9. [Illegible text]
10. [Illegible text]
11. [Illegible text]
12. [Illegible text]
13. [Illegible text]
14. [Illegible text]
15. [Illegible text]
16. [Illegible text]
17. [Illegible text]
18. [Illegible text]
19. [Illegible text]
20. [Illegible text]

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

What would be the results of all the people in the world losing the ability to reproduce offspring?

- a. Race would die out.
- b. No more babies.
- c. No more baby doctors.
- d. No more diapers, toys, etc.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
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9. _____
10. _____
11. _____
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13. _____
14. _____
15. _____
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17. _____
18. _____
19. _____
20. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

LIST AS MANY DIFFERENT
CONSEQUENCES AS YOU CAN.

What would be the results if it appeared certain that within three months the entire surface of the earth would be covered with water, except for a few of the highest mountain peaks?

- a. Everyone will move to mountain peaks
- b. Increased sale of boats
- c. Business failure
- d. Panic

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
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17. _____
18. _____
19. _____
20. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PLEASE AS PARTY INTERVIEWER
CONSENT TO USE AS YOU CAN.

VII

What would be the results if everyone suddenly lost the ability to read and write?

- a. No newspapers or magazines
- b. No libraries
- c. No mail or letters
- d. T.V. sales increase

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

LIST AS MANY DIFFERENT
CONSEQUENCES AS YOU CAN.

VIII

What would be the results if human life continued on earth without death?

- a. Overpopulation
- b. More old people
- c. Housing shortage
- d. No more funerals

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
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11. _____
12. _____
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16. _____
17. _____
18. _____
19. _____
20. _____

APPENDIX 2

66

LIST AS MANY DIFFERENT
CONSEQUENCES AS YOU CAN.

17

What would be the results if the force of gravity were suddenly cut in half?

- a. Jump higher
- b. More accidents
- c. Less effort to work
- d. Easier to lift things

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.

LIST AS MANY DIFFERENT
CONSEQUENCES AS YOU CAN.

E

What would be the results if suddenly no one could use arms or hands?

- a. Learn to use feet more
- b. No need for gloves
- c. Clothing would be changed
- d. Couldn't drive cars

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
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17. _____
18. _____
19. _____
20. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

CITY OF LOS ANGELES

Form "A"

Paul R. Christensen, J.P. Guilford, Philip R. Brown, et al.
and Robert C. Watson

NAME _____ TEST _____
GROUP _____ DATE _____

In this test, you will be asked to consider some common objects. Each object has a common use, which will be stated. You are to list as many as six other uses for which the object or parts of the object could serve.

EXAMPLE:

Given: A NEWSPAPER (used for reading). You might use it in any of the following other ways for a newspaper.

- a. start a fire
- b. wrap garbage
- c. swat flies
- d. stuffing to pack boxes
- e. line drawers or shelves
- f. make up a kid's outfit

Notice that all of the uses listed are different from each other and different from the primary use of a newspaper. Each described use should be different from others and from the common use.

Do not spend too much time on any one item. Write down the first idea that occurs to you and go on to the others in the same way. You may get to the incomplete items in a Part if time for that Part permits.

There are three parts to this test, with three items per part. You will have 4 minutes for each part.

If you have any questions, ask them now.

STOP HERE. WAIT FOR INSTRUCTIONS.

PART I

List as many as you possible uses for each of the following objects:

1. SHOE (used on footwear)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

2. BUTTON (used to fasten things)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

3. KEY (used to open a lock)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART F.

List as many as six possible uses for each of the following objects.

4. CHAIR (used for sitting)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

5. WATCH (used for telling time)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

6. SAFETY PIN (used for fastening)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

PART III

List as many as you possible words for each of the following objects.

7. WOODEN PENCIL (used for writing)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

8. AUTOMOBILE TIRE (used on the wheel of an automobile)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

9. EYEGLASS (used to improve vision)

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

APPENDIX 2

94-10

WORD FLUENCY

Form "A"

By Paul R. Christensen and J. P. Guilford

NAME: _____ SEX: _____
 GROUP: _____ DATE: _____

In this test you are to write words that contain a certain letter of the alphabet. This will be a different letter in each form of the test.

SAMPLE ITEM:

Write words containing the letter *o*

load *provide*
pot *thought*
over *island*
top

All the words written above contain the letter "o" at least once.

WAIT FOR THE SIGNAL BEFORE TURNING THIS PAGE

Avoid using a word more than once; avoid even different forms of the same word, such as "broad" and "bonded." Your score will be the number of words and phrases containing the given letter during limited time, so work rapidly.

There are two parts to this test. You will have 2 minutes for each part.

Are there any questions?

STOP HERE. WAIT FOR SIGNAL TO TURN OVER

PART I

WRITE WORDS CONTAINING THE LETTER B.

1. The first part of the report discusses the importance of maintaining accurate records of all transactions.	2. It then goes on to describe the various methods used to collect and analyze data.	3. Finally, it concludes with a summary of the findings and a discussion of their implications.
4. The second part of the report focuses on the results of the experiments conducted over a period of six months.	5. This section includes a detailed description of the experimental setup and the procedures followed.	6. The results are presented in a series of tables and graphs, which clearly illustrate the trends observed.
7. In the third part, the author discusses the limitations of the study and suggests areas for future research.	8. This part also includes a comparison of the findings with those reported in previous studies.	9. The author concludes by emphasizing the need for further investigation in this field.
10. The final part of the report provides a comprehensive overview of the entire study, from the initial objectives to the final conclusions.	11. It also includes a list of references and a bibliography of the sources consulted.	12. The report is well-organized and easy to read, making it a valuable resource for anyone interested in the subject.

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS.

APPENDIX 2

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PART II

WRITE WORDS CONTAINING THE LETTER T.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting. 2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the statistical analysis performed. 3. The third part of the document presents the results of the study. It includes a series of tables and graphs that illustrate the findings of the research. The data shows a clear trend of increasing activity over time, which is consistent with the hypothesis. 4. The fourth part of the document discusses the implications of the findings. It suggests that the results have significant implications for the field of study and may lead to further research in this area. 5. The fifth part of the document concludes the study. It summarizes the key findings and provides a final statement on the importance of the research.	1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting. 2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the statistical analysis performed. 3. The third part of the document presents the results of the study. It includes a series of tables and graphs that illustrate the findings of the research. The data shows a clear trend of increasing activity over time, which is consistent with the hypothesis. 4. The fourth part of the document discusses the implications of the findings. It suggests that the results have significant implications for the field of study and may lead to further research in this area. 5. The fifth part of the document concludes the study. It summarizes the key findings and provides a final statement on the importance of the research.	1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting. 2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the statistical analysis performed. 3. The third part of the document presents the results of the study. It includes a series of tables and graphs that illustrate the findings of the research. The data shows a clear trend of increasing activity over time, which is consistent with the hypothesis. 4. The fourth part of the document discusses the implications of the findings. It suggests that the results have significant implications for the field of study and may lead to further research in this area. 5. The fifth part of the document concludes the study. It summarizes the key findings and provides a final statement on the importance of the research.
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STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

APPENDIX 3

THREE TABLES OF RAW DATA

Table VI.-

Raw Scores Obtained by the High Group on the Inclusion Test
and Seven Divergent-Thinking Tests.

<u>Inclusion</u>	<u>Obvious</u>	<u>Remote</u>	<u>Word Fluency</u>	<u>Alt. Uses</u>	<u>Ident. Fluency</u>	<u>Exp. Fluency</u>	<u>Assoc. Fluency</u>
66	9	0	15	0	13	0	0
66	10	3	15	0	22	4	0
66	0	1	15	0	14	0	1
66	21	1	11	0	10	2	7
65	2	1	0	2	7	2	3
42	0	1	16	2	12	1	1
49	32	3	12	0	22	0	11
43	0	3	12	4	0	3	3
46	20	2	0	0	21	3	3
44	20	4	0	2	12	2	3
44	3	0	15	1	7	1	0
42	0	0	17	0	15	2	1
40	10	3	0	0	13	2	0
39	15	3	25	3	12	0	3
38	2	0	0	0	11	2	2
34	16	0	10	2	20	1	0
34	30	0	15	0	10	2	0
34	7	0	3	0	6	0	4
34	15	1	0	3	15	3	1
32	11	1	12	2	11	2	12
32	20	0	21	3	27	0	0
31	16	0	17	0	26	3	4
31	13	1	0	0	10	0	2
31	4	0	10	3	14	1	0
31	10	2	13	1	13	3	3
Σ 1195	329	16	339	63	305	52	117

Table VII.-

Raw Scores Obtained by the Middle Group on the Inclusion Test
and Seven Divergent-Thinking Tests.

<u>Inclusion</u>	<u>Obvious</u>	<u>Remote</u>	<u>Word Fluency</u>	<u>Alt. Uses</u>	<u>Ideat. Fluency</u>	<u>Exp. Fluency</u>	<u>Assoc. Fluency</u>
30	17	2	16	1	12	6	5
30	6	0	14	3	20	4	9
28	10	2	15	2	13	1	0
27	2	3	11	2	17	0	4
27	9	1	20	3	11	4	4
26	12	7	11	0	21	0	7
26	0	5	17	0	13	0	7
25	14	6	10	3	14	2	9
23	23	0	13	4	20	1	2
23	4	0	10	0	13	0	4
22	5	0	4	0	6	0	4
22	14	4	19	3	10	1	4
22	19	10	10	0	23	3	9
22	20	1	17	2	15	6	0
22	6	1	11	5	14	1	4
21	4	10	5	0	11	2	4
21	0	0	6	0	12	1	4
20	10	10	17	5	13	3	6
19	0	3	14	1	0	3	9
16	13	0	17	5	11	0	2
18	0	1	16	1	24	3	7
15	13	1	12	6	11	2	0
15	10	1	16	0	14	1	11
15	6	0	14	3	20	1	5
14	10	0	21	6	21	1	10
Σ 552	267	89	354	75	372	91	150

Table VIII.-

Raw scores obtained by the Low Group on the Inclusion Test
and Seven Divergent-Thinking Tests.

Inclusion	Obvious	Remote	Word Fluency	Alt. Uses	Ideat. Fluency	Exp. Fluency	Assoc. Fluency
13	10	6	12	3	20	1	7
12	0	0	15	1	11	2	0
11	17	5	16	6	26	3	9
11	7	2	14	7	5	3	5
10	4	0	25	9	10	6	10
10	2	3	14	5	16	0	0
10	3	0	0	1	1	1	4
9	5	5	19	4	13	2	11
9	22	7	23	11	27	5	11
8	23	3	16	6	21	0	0
8	36	10	20	0	34	6	10
0	0	1	20	10	17	0	4
8	0	0	11	2	14	3	1
7	5	2	13	1	14	1	2
7	0	12	15	6	19	0	0
0	17	6	21	6	22	4	0
6	13	14	25	5	26	4	8
4	12	1	34	7	27	0	0
4	17	0	11	3	16	4	2
4	13	13	31	7	24	0	4
3	10	10	26	6	22	4	0
3	21	9	29	14	29	5	11
2	10	14	22	0	16	4	9
2	4	0	16	1	13	3	0
1	29	10	17	11	35	3	5
Σ 170	300	167	460	147	403	85	163

APPENDIX 4

ABSTRACT OF

Overinclusion and Divergent Thinking in Schizophrenia¹

Interference Theory has been advanced, with considerable experimental support, as an explanation of thought disorder frequently encountered in schizophrenia. One construct of this theory, namely, overinclusion, has been postulated as resulting in impaired concept formation. Thinking with such concepts reduces the precision and accuracy of cognitive formulations where specific and frequently conventional behavioral sequences are required because irrelevant and peripheral aspects of the situation are readily included in the conceptualization. That overinclusion might be a cognitive asset, given different situational circumstances, has not received much consideration although a possible association between overinclusion and creative thinking has been occasionally cited in the behavior of schizophrenic persons.

This study was undertaken to investigate such a consideration more thoroughly. It was hypothesized that varying degrees of overinclusion would be associated with varying degrees of creative thinking, and that overinclusion would influence aspects of creative thinking selectively. Creative thinking was defined in terms of six factors of divergent-thinking found in Guilford's Structure-of-Intellect Model.

¹ A. Eugene Palcanis, doctoral thesis presented to the Faculty of Psychology and Education of the University of Ottawa, Ontario, May 1966, vii-161 p.

Overinclusion was defined in terms of scores on Epstein's Inclusion Test and the operational referents of the divergent-thinking abilities were six tests considered to be "pure" measures of each. Seventy-five recently hospitalized schizophrenic persons, between the ages of twenty-one and fifty-five, who demonstrated at least average intelligence, were the subjects for the study.

The first hypothesis of relationships between overinclusion and divergent-thinking was supported at an acceptable level of statistical significance. The second hypothesis of differences among the relationships between overinclusion and divergent-thinking abilities was also supported. Significant relationships between overinclusion and Word Fluency and Semantic Spontaneous Flexibility were demonstrated. The third hypothesis of differences in levels of divergent-thinking according to degree of overinclusion was not supported following t tests of the group mean differences. The findings therefore had only limited meaning in terms of Interference Theory. A critical examination of the study did not reveal a breach of experimental procedure which could be cited as accounting for the findings.

It was hypothesized that what has been frequently cited as creative thinking among schizophrenic persons demonstrating overinclusion may not be the same as creative thinking defined in terms of divergent-thinking abilities, and should be restricted to the ability Semantic Spontaneous Flexibility. Furthermore, the need for further theoretical and psychometric clarification of overinclusion was stressed. Suggestions for future research were proposed.

ERRATA

Page 45 omitted, therefore, two pages numbered 61.

Page 5.- Line 6: scoring should read sorting.

Page 16.- Footnote 33 and bibliographic entry: pagination should read 2-24.

Pages 21, 23.- lahan should read lusan.

Page 62.- Sturm publication date: 1765.

Table V.- page 56 should read page 55.