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DIFFERENTIAL ANALYSIS OF CREATIVITY AND IMAGINATION BETWEEN GIFTED AND NON-GIFTED HIGH SCHOOL STUDENTS AS ASCERTAINED BY THE KINGET DRAWING-COMPLETION TEST

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DIFFERENTIAL ANALYSIS OF CREATIVITY AND IMAGINATION BETWEEN GIFTED AND NON-GIFTED HIGH SCHOOL STUDENTS AS ASCERTAINED BY THE KINGET DRAWING-COMPLETION TEST

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CHAPTER I

INTRODUCTION AND ORIGIN

Ever since man became conscious of himself, creativity and imagination have had in it something of mystery and magic, and have seemed a process which cannot be completely understood. Imagination and creativity have generally been regarded as that kind of thought process which results in something socially useful, such as a work of art, a new idea, a scientific contribution, an invention, or a creation of a gadget. Despite the fact that creativity and imagination have been a matter of interest among psychologists for many years, most studies and discussions of the subject have been of a speculative nature. These speculative studies of creativity and imagination have attributed wide differences in meaning to the terms. It appears to have been used interchangeably with such other concepts as originality (Chassell and Cleeton), creative imagination (Ribot), inventiveness (Rossman), creative

intelligence (Hirsch), creative thought (Weinland and Patrick), and insight (Hutchinson).

Ribot's[1] early work "The Creative Imagination" states that man is creative or able to create because of "(1) the motor activities produced by appetites, tendencies, and desires, and (2) the possibilities of spontaneous revival of images that become grouped in new combinations." Wertheimer[2] similarly proposes that creative thinking is the successful transposition of a member of one configuration to another. Spearman[3] maintains that the primary method of creative thought is the "educing of correlates . . . the transplanting of an old relation and in consequence the generating of a new correlate." Pillsbury[4] and Maier[5] indicated a like process but emphasize the purposefulness or goal directedness of the process to distinguish it from idle phantasy or day-dreaming. Warren's Dictionary of Psychology[6] defines creativity as "the capacity of certain persons to produce compositions of any sort which

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[1]T. Ribot, Essay on the Creative Imagination (Chicago: Open Court Publishing Company, 1906).

[2]R. R. Wertheimer, Productive Thinking (New York: Harper and Brothers, 1945).

[3]C. Spearman, Creative Mind (New York: Appleton and Company, 1931), pp. 158-

[4]W. B. Pillsbury, The Psychology of Reasoning (New York: Appleton and Company, 1910).

[5]N. R. F. Maier, "Reasoning for Learning," Psychological Review, XXXVIII (1931), pp. 432-446.

[6]H. C. Warren, Dictionary of Psychology (Boston: Houghton Mifflin Co., 1934).

are essentially novel or which were previously unknown to the producer." Finally, Morgan,[7] in an extensive review of the literature on creativity and imagination reaches the conclusion that most definitions of creativity were meaningless and he offers his own for consideration. He suggests that the creative process is one which "produces a creative work."

For this study, creative imagination is related to memory, and may be defined as the mental process of adjusting or manipulating the environment which results in the production of new ideas, patterns or relationships. This definition is derived from Morgan,[8] Averill,[9] Murphy,[10] and Monroe.[11]

The word creative carries the connotation of "constructive." It is a value judgment upon the products of imagination. Creative users of imagination are those which lead to the most healthful development of individual personality or to improve

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[7]J. J. B. Morgan, Child Psychology (New York: Richard R. Smith and Company, 1931), p. 215.

[8]Morgan, op. cit., p. 215.

[9]L. A. Averill, Psychology of the Elementary School Child (New York: Longmans Printing Company, 1949), p. 214.

[10]G. Murphy, Personality -- A Bio-Social Approach to Origins and Structures (New York: Harper and Brothers, 1947), p. 272.

[11]Paul Monroe, A Cyclopedia of Education (New York: The MacMillan Company, Vol. 3, 1912), pp. 385-388.

social relations. This definition is in accord with that of Averill[12] and Gesell.[13]

In our highly complicated world of today, with its specialized activities in every line of business, schools, government, recreation, and developments, it is quite necessary that the individual make the most of his opportunity and not lose time and energy trying to find his niche in the scheme of things and life.

In pursuance of this study, it is hoped that certain aspects of theoretical and empirical nature of creativity and imagination will be brought into focus by a diagnostic instrument, The Kinget Drawing-Completion Test, and three psychological measuring instruments, The Otis Quick-Scoring Mental Ability Test, The Guilford-Zimmerman Temperament Survey, and The Kuder Vocational Preference Record.

THE KINGET DRAWING-COMPLETION TEST

The Kinget Drawing-Completion Test is a relatively new projective technique for the investigation of personality. The origin of the test is found in Gestalt Psychology, as developed under Dr. F. Krueger and Dr. F. Sanders at the University of Leipzig. It was assumed that not only the object of experience but also the experiencing subject was a structure. Experience was molded by the personality

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[12]Averill, loc. cit.

[13]A. Gesell, Studies in Child Development (New York: Harper and Brothers, 1948), p. 161.

structure; therefore, experience, as revealed in activity, bore the mark of the structure, and it was possible to infer the nature of the structure from activity. In everyday life, the nature of the structure might not be easily seen, but the personality structure might become apparent in situations free from the ordinary restrictions of daily life.

To support these views, Krueger and Sanders devised a "Phantasie Test" in which the subject was confronted with material of the kind used in the Drawing-Completion Test; but he did not carry the analysis of his data beyond obvious characteristics. Then later, after some success of Sanders' experiments, Dr. Ehrig Wartegg, also of the University of Leipzig, continued along the same line of investigation as Sanders' approach and devised and created the instrument in its present form, the drawing sheet utilized by Dr. Marian Kinget. Wartegg's test blank included the following features:

1. Meaningless stimuli in a variety of forms, sizes, locations and structures appropriate for exploring a broad range of experiences in a free and unstructured manner as possible and still retaining a basis for objective and consistent evaluation.
2. The use of square drawing areas, which have been experimentally shown to be the geometric shape freest from limiting influences for projective drawings.

3. The use of small drawing areas, which aid in focusing attention on a limited area and the viewing of all drawings on one page, but which have been shown to allow rather elaborate drawings.
4. An intensely dark frame favoring concentration upon the stimuli in each individual frame.

Wartegg devised a personality schema composed of four basic functions: Emotion, Imagination, Intellect, and Activity. Each four was divided into a dichotomy, which gave a schema of personality with eight functions: Open Emotion, Seclusive Emotion, Combinative Imagination, Creative Imagination, Practical Intellect, Speculative Intellect, Dynamic Activity, and Controlled Activity. Wartegg outlined the content of these functions, and Kinget later extended and refined the content of each function. According to Kinget, the clinical value of the schema depends upon the degree of differentiation obtained by the test; therefore, the clinical value of the schema of the Kinget Drawing-Completion Test is not fundamental but only practical.

Kinget's initial step in validation was to work out the content of eight psychological functions of the personality schema and to construct some kind of verbal test against which the drawings could be validated. Multiple criteria were devised and consisted of the following:

1. A Sixty-six item questionnaire was constructed in a manner similar to that of the Bernreuter

Personality Inventory and consisted of items for diagnostic purposes. Validation of the questionnaire was accomplished by a preliminary study by five experts, a subsequent administration to fifty subjects, and treatment of the data by a method of internal consistency.

2. A forced-choice test was constructed and consisted of 166 pairs of words with the pairing arranged to indicate an affinity in regard to the components of the personality schema. Validation of the forced-choice test was conducted along the lines similar to those of the questionnaire.
3. A rating scale of eighty direct questions was utilized with individuals who knew the subject well, were not closely related to the subject, and who presented certain guarantees of ability in observing and judging people.

To validate the Drawing-Completion Test, the questionnaire and forced-choice test were administered to 383 subjects for their self-evaluation. This group of subjects was composed of approximately equal numbers of males and females between the ages of eighteen and fifty, and represented a wide range of educational backgrounds. The rating scale was administered to persons acquainted with the members of the validation population as a check with the other two criteria. The results were evaluated in respect to the relative weight

of the polar aspect of each of the four basic functions of the personality schema. The results of this procedure suggested certain modifications, which increased the diagnostic adequacy of the Drawing-Completion Test.

The product of Kinget's work is a scoring and interpretative system of thirty-five scoring variables in terms of which all eight drawings of the test are evaluated. The scores for the various scoring variables are combined to form a profile indicating the relationship among the eight psychological functions of Kinget's personality schema. A summary of the general merits of the Drawing-Completion Test, as presented by Kinget, include the following:

1. The subject is presented with almost unstructured material, allowing vast possibilities for free-association and expression.
2. The examiner is presented with highly structured material and a number of criteria for the objective evaluation of the material, involving little time for the administration, scoring, and interpretation, as well as for the induction into the diagnostic mechanism.

Very few studies have been published involving The Kinget Drawing-Completion Test. Therefore, as part of this study, The Kinget Drawing-Completion Test will be used and an effort will be made to discover the relationship between two groups of subjects from two different points along the

continuum of intelligence as to the variables creativity and imagination.

The content of the functions of imagination and its two component parts "Combining" and "Creativity" as outlined by Kinget includes: The Imagination-Combining type draws its material from the milieu, fits it into the world of sensorial experiences according to objective standards and oriented toward visible reality; Imagination-Combining may present an emotional undercurrent -- resulting in an esthetic tendency; and the Imaginative-Creativity kind is characterized by the looseness of its association with visible reality, its preference for abstract constructs or symbols of emotional, philosophical, or mystical sort. A predominance of this kind of imagination is most likely to be an obstacle to complete adjustment to ordinary life.

A SUMMARY OF KINGET'S DRAWING-COMPLETION TEST

The Drawing-Completion Test, based on the Wartegg test blank, consists of graphic stimuli, "serving as a series of formal themes, which the subject is asked to develop in his own way."- Its principle aim is to reveal the structure of personality. The author traces the origin and development, cites extensive validational studies, and discusses administration and scoring procedures. Most of the volume is devoted to an illustration of quantitative and qualitative interpretative principles, complete with case material and

reproductions. Specially designed scoring and interpretation sheets accompany the test blanks.

THE INTELLIGENCE TEST

The Otis Quick-Scoring Mental Ability Test which was designed to be used with senior high school students, college students, and adults will be used as the instrument to isolate the population into two Intelligence Quotient (I. Q.) groups needed for this study. Differentiation of groups by I. Q. will be discussed in the section of statement of the problem.

THE GUILFORD-ZIMMERMAN TEMPERAMENT SURVEY

The Guilford-Zimmerman Temperament Survey was chosen because it has norms for high school students and because of its similarity to the Minnesota Multiphasic Personality Inventory. The Guilford-Zimmerman Temperament Survey, when administered, will produce internal validity or factorial validity of the scores which is fairly well assured by the foundation of factor analysis studies plus the successive item-analysis directed toward internal consistency and uniqueness. It is believed that what each score measures is fairly well defined and that the score represents a confirmed dimension of personality and dependable descriptive category. Each score is probably a fairly clear indicator of one unique trait which has been identified by factor analysis procedures.

THE KUDER VOCATIONAL PREFERENCE RECORD

The Kuder Vocational Preference Record is for use with high school and college students, and with adult men and women. The occupational norms consist of the means and standard deviations of each occupational group on each interest scale, and graphic profiles based on these same means. Primary mental abilities, which can be measured specifically, are easily correlated with the Kuder scores. Therefore, intelligence abilities in relationship to interest scores can be measured.

STATEMENT OF THE PROBLEM

The dearth of experimental data in the area of special abilities and, in particular, creativity and imagination invite research. However, except for measures of minimum capacities, which may be acquired by learning as well as by natural gift, measurement of the phenomenon, creativity and imagination have been extremely difficult to formulate. The approach to creativity and imagination have been extremely difficult to formulate. The approach to creativity and imagination in this investigation can best be classified as a "molar" one, in the same sense discussed by Littman and Rosen, Alport, or Brunswich in Marx "Psychological Theory."[14] An investigation of this nature does not result in an absolute or laws, but merely in

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[14]Melvin H. Marx (editor), Psychological Theory, (New York: MacMillan and Company, 1951).

a demonstration of the relationships obtained between some of the more critical variables involved in the area of investigation. It involves the identification or exploration of a phenomenon in terms of its similarities to and differences from one phenomena which is, if not better known, at least specifiable. This type of study is especially appropriate for areas in which there is as yet insufficient data to permit adequate theorization. Therefore, the purpose of this study is to discover a way in which creativity and imagination can be determined with high school students at two intellectual levels and to determine their difference in creativity and imagination as measured by the Kinget Drawing-Completion Test.

In brief, this will be an attempt to identify each subject's interest patterns as measured by the Kuder Vocational Preference Record; and their personality characteristics as as measured by The Guilford-Zimmerman Temperament Survey.

There are several reasons for the selection of this study of Creativity and Imagination. First, very little research has been made in the important area of Creative Imagination. Guilford[15] has estimated that less than two-tenths of one per cent of the books and articles listed in the abstracts for approximately the past quarter of a century bear directly on this subject, and few of these advance our understanding or control of creative activity appreciably.

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[15]J. P. Guilford, "Creativity," The American Psychologist, V, (1950), p. 445.

It was hoped that this study would contribute to better understanding of this phenomenon.

Second, much of the investigation on imagination has been done from a negative point of view, emphasizing the dangers of personality resulting from non-constructive uses of this capacity as excessive escape mechanisms, wishful fantasies, and withdrawal from reality. It was hoped, however, that this study could discover through the use of The Kinget Drawing-Completion Test some method of fostering the more positiveness and identification of creative imagination in each of the subjects.

Third, most all observations and studies published in the area of creativity and imagination have emphasized the importance of creative imagination for the development of mature, healthy, and constructive personalities. Recognition of this importance came from several sources, to cite a few: Industries, employing many scientists and engineers, are devoting substantial amounts of time and money to the question of why one person can come up with new ideas, while dozens of others merely do a passable job on the routine tasks assigned to them. Gesell[16] and Guilford[17] have described this growing awareness of the importance of creative imagination. Murphy expresses it well when she states, "Not that we should set up as a fetish the idea that it is important for every child

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[16]Gesell, loc. cit., p. 162.

[17]Guilford, loc. cit., p. 447.

to try to be outstanding creatively, or that creativeness is the only way of fulfilling oneself or leading an effective or happy life. On the other hand, there is, on the whole, good evidence that creation can give a good deal of satisfaction and there is a great deal of potential creativeness which is being wasted through ineffective or even stupid methods. Society also needs creativeness, not only from a few geniuses, but from all members of the community."[18]

THE HYPOTHESES

As a result of reviewing the related literature on creative imagination and efforts to integrate this study into the framework of educational research, there are three major working hypotheses which are present:

1. There are no statistically significant mean differences in imagination and creativity as measured by The Kinget Drawing-Completion Test for the gifted and non-gifted high school students.
2. There are no statistically significant mean differences in interest patterns between the gifted and non-gifted high school students, as measured by The Kuder Vocational Preference Record.
3. There are no statistically significant mean differences in personality characteristics between

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[18] Murphy, loc. cit., p. 325.

the gifted and non-gifted high school students as measured by The Guilford-Zimmerman Temperament Survey.

Upon which these hypotheses are based, it is assumed that imagination is an inherited special attitude, the expression of which is influenced by other aptitudes, interests, temperamental qualities, and attitudes of total personality. It becomes creative when it is used constructively to contribute to the optimum development of individual personality or improve social relations.

It is also assumed that everyone possesses imaginative and creative potential. Guilford says ". . . creative acts can therefore be expected, no matter how feeble or how infrequent, of almost all individuals . . . ."[19]

The third assumption is: there is a positive correlation between creativity and intelligence. A person of high intelligence can be expected to demonstrate more creative behavior since his intelligence makes it easier to communicate that which he imagines. However, this positive correlation is not inevitable. Gesell[20] states, "it is sadly true that high I. Q. is often associated with meager creativity." As Guilford[21] points out, although most of the children in

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[19]Guilford, loc. cit., p. 446.

[20]Gesell, loc. cit., p.143.

[21]Guilford, loc. cit., p. 447.

Terman's study have reached the age level that has come to be recognized as the most creative, there seems to be little promise of a Darwin, an Edison, or a Eugene O'Neill. Furthermore, industry has discovered that high scholastic achievement is not a guarantee of creative novel ideas.[22]

The fourth assumption is: creativity depends greatly upon imagination. It is proposed that imagination is an inherited special aptitude, as much a distinct ability as are artistic and musical talent.

The fifth assumption is: creative imagination is a product of the total personality. It is "the pattern of mental organization, the type of interaction between abilities, the motives which lead to their overt manifestation, and the conditions under which these manifestations occur."[23] These capacities include specific motor skills, sensitivity to experience, and an intellectual factor which makes expressions and communication possible. The total personality also influences the way in which imagination will operate; health, activity drives, sensory capacities, and social drives all play a part. As Murhpy stated, "Thus one brings into the imaginative process everything that one has and everything that one is."[24]

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[22]E. M. Ligon, Their Future is Now (New York: MacMillan and Company, 1949), p. 448.

[23]F. L. Goodenough, Mental Testing (New York: Rhinehardt, 1949), p. 350.

[24]Murphy, loc. cit., pp. 273-274.

Murphy[25] and Jersild[26] postulate the universality of creative imagination from the observation of children, concluding "teachers are justified in assuming that all young people are potentially able to express themselves creatively." Accordingly, in this study, it is assumed that some creativity and imaginative behavior may be expected of all members of the experimental group, subject to individual differences. While imagination seems to be an expression of a common human quality, we recognize that the skills for expressing it must be learned. This means that the child must be guided in acquiring these skills. Many creative works show, in addition to novel ideas, creative imagining and great technical skills.

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[25]G. Murphy, An Introduction to Psychology (New York: Harper and Brothers, 1951), p. 119.

[26]A. T. Jersild, Child Psychology, 3rd edition (New York: Prentice-Hall, 1947), p. 11.

CHAPTER II

REVIEW OF THE LITERATURE

The relatively recent appearance of Kinget's test necessarily eliminates any mention of its appearance in psychological literature of material relevant to the Drawing-Completion Test. Current literature, however, does present material on the topics relevant to creativity, thinking, imagination, originality, fluency, and phantasy; these studies are concerned with the subjectivity in evaluating these different concepts of the creative process.

A brief review of how psychology has approached the problem of creativity and imagination is necessary. Imagination and creativity have been limited practically to the last century, or even the last fifty years. A discussion going back to an earlier date would be merely a matter of erudition and not of great scientific interest.

The first works dealing with creativity and imagination from a modern standpoint were written about the first of the nineteenth century, but dealt with mental imagery rather than creativity and imagination. In fact, from 1825 until 1890, nearly all of value written in the field of creativity and imagination was on the topic of imagery.

It would be impossible to mention here even the titles of all the books and articles that have been written on the imagination during the last twenty-five years. Neither would it be consonant with the purpose of this study. The vast number of literary, philosophical, and pedagogical discussions must be passed over without notice; although many of these contain flashes of psychological insights and will be cited occasionally in the empirical section of this study.

The material presented in this study of imagination and creativity is not in chronological order; the order of presentation corresponds, however, to the differing emphasis of successive periods in the development of the psychology of imagination and creativity.

As mentioned by Vernon[27] in the late nineteenth century, the methods of correlation were devised, largely by Galton and Pearson, for measuring the agreement between two sets of scores. Some of the first applications of this method to mental functions were made by Wissler (1901) but with no significant and contributional results.

From 1904, when Spearman published his correlations between sensory tests and estimates of intelligence, to the present many psychologists individually and collectively have discovered and identified factors other than the "g" factor.

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[27]Philip E. Vernon, The Structure of Human Abilities (London, England: Methuen and Company, Ltd., 1950), p.160.

It is with the distinctive imaginative factor "i" analyzed by Holzinger (1938) for which the present study and review is concerned.

So many factors are involved in imagination and creativity that it seems desirable to study one, at least, which may be essential to all types. In this study, the writer assumes that the ability to readily recombine or recognize ideas according to some pattern is essential to all types of imagination, creativity, and thinking, whether it be painting a landscape, drawing, reproducing, inventing some new scientific instrument, or composing a new advertisement.

IMAGINATION

A wide variety of materials and methods have been used in the study of imagination. Whipple's[28] manual lists over a half a dozen different test materials for which norms have been obtained. Winch[29] in an attempt in his investigation to discover some of the relationships which exist between substance memory and productive imagination in school children, inferred that it is likely that a negative correlation exists between the two functions or groups of functions called by the generic names imagination and memory.

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[28]Guy Montrose Whipple, Manual in Mental and Physical Tests (Baltimore: Warwick and York, 1910).

[29]W. H. Winch, "Some Relations Between Memory and Productive Imagination in School Children," The British Journal of Psychology (Cambridge, England: Cambridge University Press, Vol. IV, 1911), pp. 95-125.

The correlation between the results of the tests in imagination and substance memory were worked out at the beginning of the experiment for this purpose. The test was made with thirty boys. They were tested in the two functions. Results of Test I correlated positively with the results of Test II, with a coefficient of .654. Then the boys were tested five times and correlations appeared high. In fact, there appeared to be considerable positive correlation in school children between the two functions. The correlation appeared higher in the case of the more proficient classes, so far as evidence went.

The studies by Leary,[30] sponsored by the Kaiser Foundation of California, have made several theoretical and critical contributions to study of imagination. This investigation of Leary was concerned with imagination or artistic level of personality. This comprised the expressions that an individual makes, not directly about his real self in his real world, but indirectly about an imagined self in his preconscious or symbolic world. This study presented a theory of and a measurement method for dealing with imaginative, preconscious behavior. The implication of the theory was that imaginative productions can be used by the psychologists to determine the amount and interpersonal sources of

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[30]Timothy Leary, "A Theory and Methodology for Measuring Fantasy and Imagination Expressions," Journal of Personality, XXV, No. 1 (1956), pp. 159-175.

anxiety and to predict future behavior. The Kaiser Foundation method for rating the interpersonal aspects of imaginative expressions was applied on two samples to test the hypothesis that fantasy expressions predict the amount and kind of change to be expected in future conscious self-descriptive behavior. The hypothesis held for one sample, but not for the other. This could be attributed to the complexities and peculiarities of either sample.

Pine[31] described in his study of relationships between the creative quality of imagination productions on the one hand and the ways in which drive content appears in these productions on the other. A central finding was that higher quality literacy productions include more drive content than did lower quality productions. A similar result was found in scientific productions where drive content was evoked by the given problem. Furthermore, a positive correlation between controlled drive expressions and quality of productions was also found. The degree of cross-test consistency in the quality of imagination productions was investigated. Spearman's rank correlations were computed between all pairs of tests in the quality score. Empirical evidence of relationships between drive dynamics and quality of literary productivity was discovered. The creative person in either literature

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[31]Fred Pine, "Thematic Drive Content and Creativity (Fantasy Content and Creativity)," Journal of Personality, XXVII, No. 2 (1959), pp. 136-151.

or sciences may be described as one with a heightened receptivity to thought contents which can be molded into creative production. Rank correlations were computed between the quality scores and the drive content scores, correlation between the quality scores and total drive presence were carried out with Kendall's tau. Drive presence was partialled out on all other correlations between quality and the drive content scores. There were strong correlations between pairs of quality scores that were positive; there were also several negative correlations.

ORIGINALITY

Josiah Royce[32] in 1898 made an excellent formulation of the problem of giving a psychological definition of originality and reported the results of an experiment intended to demonstrate invention in a simple fashion. Royce reduced the problem of studying invention experimentally to the problem of devising experimental conditions for encouraging imagination, creativity, and individuality.

Chassell,[33] in 1914 assembled a group of twelve tests designed to measure originality and to determine by trial the relative value of these tests as a means of ranking the members

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[32]J. Royce, "The Psychology of Invention," Psychology Review (Baltimore, Maryland: The Review Publishing Company, V, 1898), pp. 113-149.

[33]Laura M. Chassell, "Tests for Originality," The Journal of Educational Psychology, VII, No. 6 (June, 1916), pp. 317-328.

of a group in terms of originality. The selected tests were applied to one hundred students drawn from all classes in Northwestern University and also to one inventor of international reputation. Some of the tests were taken from the chapter on tests of imagination in Whipple's Manual; others were developed by Chassell. The experiment consisted of a variety of tests, numbering twelve, but that "item" of the test with which this study should be interested is "Picture drawing." The correlations existing between the rank-order of the one hundred subjects in the several tests and their amalgamated rank-order for all the tests combined were presented. The correlations, which were computed by the Spearman "foot rule" method with R converted rate r^4 indicated the relative degree to which the outcome of each test agrees with the general outcome of all the tests. The probable error of r for one hundred cases may be taken as approximately 0.04. The comparison of the "Picture drawing" was .40 as compared to the highest .55. The reliability of the "Picture drawing" was .84. "Picture drawing," as studied by the experimentor might give promise of becoming a very valuable test if a few slight changes in the method were made, since its correlation with the final group rank was considerably higher than might be expected from a large number of "ties" -- a factor tending to reduce correlation.

In 1927, Hargreaves[34] conducted a factor-analytic study of the "faculty of imagination, using Spearman's method of tetrad differences. He distinguished between the quantitative and qualitative aspects of imagination and proposed two questions: (1) Is there a "Fluency" group factor? and (2) Is there an "Originality" group factor? Dividing imagination into two aspects called "Fluency" and "Originality," and marking the imagination tests constructed for these two aspects separately, he found that both Imagination ("Fluency") and Imagination ("Originality") tests have broad group factors in addition to "g". Also, there was a small factor common to the two groups. On analysis of the factors, however, no sign of a general unitary and unique imaginative power or "faculty" was found. Both "Fluency" and "Originality" appeared compound. As a result of factor analyzing his data, Hargreaves found his two experimental questions answered in the affirmative. He found two group factors which could, in fact, be regarded as a "Fluency" factor and as an "Originality" factor.

Kettner, Guilford, and Christensen[35] found much the same kind of behavior in their study of the creative individual. The factor of "originality" which they term characteristic of the creative person, consisted of two components:

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[34]H. L. Hargreaves, "The Faculty of Imagination," The British Journal of Psychology Monograph Supplement, No. 10 (1927), p. 74.

[35]N. W. Kettner, J. P. Guilford, and P. R. Christensen, "A Factor Analytic Study Across the Domains of Reasoning, Creativity, and Evaluation," Psychological Monographs, LXXIII, No. 9 (1959), Whole No. 479.

ability to respond spontaneously and the ability to include wide and varied phenomena in a single concept.

Wilson[36] tried to discover, define and measure abilities which may be important in creative thinking, particularly as it applied to science, engineering, and invention. The study was limited to eight hypothesized abilities. The study did not attempt to establish that the abilities investigated were important in creative work. A list of nine hypotheses were developed: (1) sensitivity to problems; (2) fluency of ideas -- ability to call up ideas rapidly, speed of calling up ideas; (3) flexibility -- ability to change set or adopt new avenues of approach; (4) originality -- ability to produce ideas which are uncommon, clever, or remote; (5) penetration -- ability to dwell into or through a problem to its remote, far-reaching, or indirect antecedents or consequences; (6) analysis -- ability to break things down into their essential parts; (7) synthesis -- ability to organize parts into wholes; (8) redefinition -- ability to take a part from one Gestalt or whole situation and use the part in a new way or in a new Gestalt. The ninth hypothesis, concerning an ability for evaluation, was reserved for a separate study. Sixteen

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[36]Charles Robert Wilson, "A Factor-Analytic Study of Creative Thinking" (Unpublished Ph. D. Dissertation, University of Southern California. Los Angeles: The University of Southern California Press, Abstract of Dissertation, 1953, pp. 225-227.

factors were extracted, using Tucker's adoption of the IBM machines of Hotelling's interactive procedure for determining principal components. The highest coefficient in each column of the correlation matrix was used as the estimate of communality of the corresponding variables. Communalities were re-estimated after the extraction of each successive factor. Zimmerman's graphic orthogonical method was used in rotating the axes. Of the fourteen identifiable factors, nine appeared to be related to the hypothesized abilities, five were well-known reference factors. The factor originality is perhaps of greatest interest, since it is generally regarded as the core of creative thinking.

Barron[37] investigated the disposition toward originality in his study, which was first directed toward identifying individuals who performed consistently in a relatively more or relatively less original way. Originality was defined in terms of uncommonness or response to eight tests which could be scored objectively or related reliably. To be called original, a response had to be uncommon in the sample under study, and at the same time be adequate to the realistic demands of the problem situations. The eight tests proved to be significantly correlated with one another. The S's were one hundred captains in the United States Air Force.

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[37]Frank Barron, "The Disposition Toward Originality," The Journal of Abnormal and Social Psychology, LI, No. 2 (Sept., 1955), pp. 478-485.

Of five major hypotheses which generated fifteen predictions concerning originality and which suggested by previous findings, twelve of the predictions were confirmed. Originality was found to be related to independence of judgment, to personal complexity, and to the preference for complexity in phenomena, to self assertion and dominance, and finally to rejection of suppression as a mechanism for the control of impulses. Barron[38] stated in his study of Complexity and Simplicity as a personality dimension that a preference for complexity is clearly associated with originality, (creativity) artistic expression, and excellence of esthetic judgment. Every subject of Barron's study was rated by the faculty members of his department on the degree of originality he had displayed in his work. The complex person was seen as more original, both by the assessment staff and by the faculty of his department. The correlation with the ratings on originality was .30.

Wilson, Guilford, and Christensen[39] investigated and measured individual difference in originality. Methodological problems such as definitions, the uncommonnest-of-response method, the remoteness-of-association method, and cleverness

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[38]Frank Barron, "Complexity-Simplicity As a Personality Dimension," The Journal of Abnormal and Social Psychology, XLVIII (April, 1953), pp. 163-172.

[39]R. C. Wilson, J. P. Guilford, and P. R. Christensen, "The Measurement of Individual Difference in Originality," The Psychological Bulletin, L (1953), pp. 362-370.

were discussed in terms of particular factor-analytic study of fifty-three tests designed to explore the domain of creative thinking. Five of seven tests designed to measure originality showed sufficient common variances to justify the hypothesis of an originality factor. It is felt that considerable progress has been made toward the development of objectively scored tests of originality, with promise of satisfaction reliability.

Webb[40] described originality of ideas as follows,

> "One thinks for himself . . . the number of new ideas, strange fancies, novel aspects of situations, which occurred to him, and the speed with which they occurred to his mind . . . having ideas different from others, yet not fantastic, ridiculous ones . . . the man with original ideas is able to suggest ways and means while others are still racking their brains . . . the ideas are too new; they are his own -- they apply to previous knowledge, certainly, but in fresh combinations, adapted to new circumstances . . . always depend upon their own minds to cope with a situation, instead of borrowing ideas of others."

Webb's rating showed an average reliability of .55. He published a test where the intercorrelations between other traits and hiw own trait "originality of ideas" where the correlation is as great or greater than the average reliability.

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[40]Edward Webb, "Character and Intelligence," British Journal of Psychology, I (1915).

Cleeton[41] did not attempt to designate exactly the nature of originality; rather his study was a summary of the results of experimental thinking so related to the trait. Cleeton postulated that originality is more frequently considered to be related to intellectual traits than social traits if the intercorrelations of traits ratings may be taken as a criteria.

Whiting[42] differentiated between "creative thinking" and originality thinking. The latter involves the production of new, but not necessarily useful ideas. The former combines usefulness and originality. Whiting continued to state he believed that few of us use very much of our creative ability and said that the area which offers the greatest potential in terms of making individuals to use their present level of creative ability is in helping individuals to use their present level of creative ability more effectively. The outcome of Whiting's works could give a value of "controlled imagination" (the conscious use of vivid, free-flowing imagination to create ideas under carefully controlled circumstances). These "controlled imaginations" were: (1) improving problem sensitivity; (2) idea fluency and facility; (3) flexibility of thinking; and (4) vision.

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[41]Glen U. Cleeton, "Originality," The Journal of Abnormal and Social Psychology, XXI (1926-1927), pp. 304-315.

[42]G. S. Whiting, Creative Thinking (New York: Reinhold, 1958), p. 168.

FACTOR-ANALYTIC STUDIES

Guilford[43] investigated and described the structure of the human adult intellect as seen in terms of factors. A listing of the factors that can be regarded as intellectual was made. Guilford included those factors reported by French in 1951, and those reported since that time. Of approximately forty such factors, seven were memory factors and the remaining ones had to do with thinking. An attempt was made to formulate a system into which the factors were categorized under the general heading of cognition (discovery), production (convergent thinking and divergent thinking), and evaluation. The factors in each group could be arranged according to three kinds of content of thinking: figural, structural, and conceptual. In the cognition and production groups, a second principle of classification, cutting across the content principle, pertained to the kind of things discovered in production. The result was a matrix of factors in each of the areas, with vacant cells. The variances suggested hypotheses for undiscovered factors.

A further investigation into factors of interest in thinking by Guilford, Christensen, Frick, and Merrifield,[44]

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[43]J. P. Guilford, "The Structure of Intellect," Psychological Bulletin, LIII, No. 4 (July, 1956), pp. 267-293.

[44]J. P. Guilford, P. R. Christensen, V. W. Frick, and P. P. Merrifield, "Factors of Interest in Thinking," The Journal of General Psychology, LXV (1961), pp. 39-56.

was to determine whether there are a number of distinct primary habits of interest in various kinds of thinking. In the course of their study in intellectual aptitudes in the Project on Aptitudes High Level Personnel, there were inevitably encountered questions concerning the possible roles of non-aptitude traits. This was particularly true in connection with abilities that seem most directly concerned with creative thinking. The factorial analytical study of the interest variables was reported in their study. From the intercorrelations sixteen were extracted and rotated, of which fourteen were interpreted as their primary traits or as syndromes of two or more traits.

Guilford, Merrifield, Christensen, and Frick[45] made an analytic study of seven factors pertaining to symbolic thinking, using two-hundred and forty naval air cadets and student officers. The subjects were given twenty new experimental tests and ten marked tests. The correlation matrix was analyzed by Thurstone's centroid method, yielding fifteen factors, thirteen of which were readily interpretable after orothogonal rotation by the Zimmerman method. Six of the seven reference factors emerged with varying degrees of clarity: cognition of symbolic relations, convergent production of symbolic transformations, cognition of symbolic

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[45]J. P. Guilford, P. P. Merrifield, P. R. Christensen, and J. W. Frick, "Some New Symbolic Factors of Cognition and Convergent Production," Educational and Psychological Measurements, XXI (1961), pp. 515-541.

units, cognition of symbolic classes, cognition of symbolic implications, and convergent production of symbolic systems.

Guilford, Wilson, and Christensen[46] investigated a factoral analytic study of creative thinking, where a battery of tests covering eight abilities were hypothesized as being important in creative thinking as assembled and administered to four-hundred and ten air cadets and student officers. The scores were intercorrelated and sixteen factors were extracted by Tucker's IBM adaptation of Hoteling's principal components method. Orothogonal rotations resulted in fourteen readily identifiable factors, a doublet, and a residual previously identified: originality, redefinition, adaptability, flexibility, spontaneous flexivility, and sensitivity to problems.

Guilford,[47] in his research findings in some thinking abilities have been divided into four areas: reasoning, creative-thinking, evaluation, and planning. A general reasoning factor found in most intelligent tests was conceived to be the "ability to structure a problem preparatory to solution." Two other factors were education of perceptual and education of conceptual relations. Two deductive factors

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[46]J. P. Guilford, R. C. Wilson, and P. R. Christensen, "A Factor-Analytic Study of Creative Thinking." II Administration of Tests and Analysis of Results. (University of Southern California, Report of Psychological Laboratory, No. 8 1952), p. 24.

[47]J. P. Guilford, "Some Recent Findings on Thinking Abilities and Their Implications," Journal of Communication, III, No. 1 (1953), pp. 49-58.

have been found -- logical reasoning, which is sensitivity to logical consistency, and eduction of correlates, the completion of relationships. An essential factor in creative thinking was the ability to redefine the problem. Findings warn us not to assume too much generality for any ability or trait that may be hypothesized.

CREATIVE PROCESSES

Although thinking is usually regarded as a man's highest and most useful function, progress toward its understanding has been slow. Progress in the understanding of any subject is indicated roughly by the number of useful and enduring concepts that have been invented to describe it.

Spearman proposed the concept of relations and of eduction of correlates. By eduction of relation, he meant, that we are presented with two objects and we can see relations between them. By eduction of correlates, he meant, that when we are presented with an object plus a relationship we can think of a second object to complete the picture -- two objects in relation.

If we wish to train and be trained to be creative producers, the creative factors should give us much to think about. Like most behavior creative activity probably represents to some extent many learned skills. There may be limitations set on these skills by heredity, but this investigator is convinced that through learning we can extend the skills within these limitations. The least we can do is to remove the

blocks that are often in the way. Everyone can be creative to some degree in many ways. Recognizing this simple truth is another big step. The next step depends upon practice, practice, and practice. Society's responsibility is to provide a favorable environment, and education the appropriate rewards for creative production.

It was thought that all types of creative people have in common a fluency of ideas. Therefore, this writer hypothesizes that the creative person is a flexible thinker.

Catherine Patrick, in a series of three studies of poets,[48] artists,[49] and a group doing scientific thinking,[50] attempted to verify experimentally the four stages of creative thought. These four stages were preparation, incubation, illumination, and verification. The first stage, preparation, was characterized as a period when thought was changing rapidly and new ideas are being received. Incubation, the second stage, was characterized by spontaneous recurrence from time to time of an idea with more or less modification while the individual was thinking of other topics. Illumination, the third stage, follows preparation and incubation and was the period when an idea, plan, or solution to a problem was distinctly formulated.

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[48]Catherine Patrick, "Creative Thought in Poets," Archives of Psychology, No. 178 (1935).

[49]Catherine Patrick, "Creative Thought in Artists," Journal of Psychology, IV (1937), pp. 35-73.

[50]Catherine Patrick, "Scientific Thought," The Journal of Psychology, V, (1938), pp. 55-83.

The fourth stage, verification, was a period of revision, trying out a solution, or working out the consequences of an idea. The group doing scientific thinking consumed less total time than others. The correlation for poets, artists, and psychologist raters indicated that the standards for judging good and bad quality were more clear-cut in scientific work than in poetry and art.

A study by Livingston[51] emphasized the importance of recombination of ideas in creative thinking. The experimentor assumed that the ability to readily recombine or reorganize ideas according to some specific pattern was essential to all types of creative thinking. It was recognized that the creative artist has many highly developed abilities, but in this experiment only his abilities to recombine ideas efficiently and quickly were tested. The test was divided into four parts and the material used was as familiar to the layman as to the artist. The test was given to thirty professional artists and forty-eight college students. The mean score of the artist group was much higher than that of the college group. The correlation between scores on this study and scores on the Wonderlic Personnel Test was very low. Critical ratios for the part scores revealed a significant difference between the groups on two parts of the four tests (II and IV), and

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[51]Livingston Welch, "Recombination of Ideas in Creative Thinking," Journal of Applied Psychology, XXX (1946), pp. 638-643.

no difference in the remaining two parts of the tests (I and III).

In a study by Fisichelli and Welch[52] the same tasks, as in Welch's earlier study, were given to a group of college students majoring in art. The results for the group were compared with the results for the groups in the previously mentioned article. It was found that college art majors did significantly better than unselected college students, but there were no significant differences between art majors and professional artists. As in Welch's earlier study, the most discriminating subtests were parts in tests II and IV.

In a third study Welch's Reorganization Test was carried out by Dougan, Schiff, and Welch,[53] and was administered to thirty-three employees in the display department at R. H. Macy's. The results were compared with those of previous studies. The display department group did not differ significantly from the college students, but did differ significantly from professional artists. A coefficient of .60 was obtained between scores on the tests and ratings of originality or creativeness by the department manager.

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[52]V. R. Fisichelli and Livingston Welch, "The Ability of College Art Majors to Recombine Ideas in Creative Thinking," Journal of Applied Psychology, XXXI (1947), pp. 278-282.

[53]Catherine Dougan, Ethel Schiff, and Livingston Welch, "Originality Ratings of Department Store Display Department Store Personnel," Journal of Applied Psychology, XXXIII (1949), pp. 31-35.

Springbett, Dark, and Clarke[54] researched in an approach to measurement of creative thinking. The experimentors suggest that creative thinking differs from conventional problem solving only because it involves a greater sensitivity to such unconscious processes.

Wilson, Guilford, and Lewis[55] investigated a series of tests designed to explore abilities considered to be important in the success of high-level personnel. In their study an attempt was made to isolate and define abilities in the domain of creative thinking, particularly as it applied to science, engineering, and invention. Fifty-three tests designed to measure aspects of creative thinking were administered to four hundred and ten air cadets and student officers. The scores were intercorrelated and sixteen factors were extracted. Orthogonal rotations resulted in fourteen identifiable factors, a doublet, and a residual.

Torrance's[56] previous works and current investigations in assessing creative thinking from kindergarten through graduate school have resulted in developing The Minnesota Tests of Creativity Thinking. These tests are classified in

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[54]B. M. Springbett, J. G. Dark, and J. Clarke, "An Approach to the Measurement of Creative Thinking," Canadian Journal of Psychology, XI (1957), pp. 9-20.

[55]Robert C. Wilson, J. P. Guilford, and Donald J. Lewis, "A Factor-Analytic Study of Creative Thinking Abilities," Psychometrika, XIX, No. 4 (1954), pp. 297-311.

[56]E. Paul Torrance, Guiding Creative Talent (New York: Prentice-Hall, Inc., 1962), p. 278.

three major categories: Non-verbal tests, verbal tests using non-verbal stimuli, and verbal tests using verbal stimuli. At this writing, the Minnesota tests have demonstrated their potential usefulness, but much work remains to be done on simplifying the scoring, developing more powerful and meaningful kinds of scores, and developing adequate norms.

Guilford[57] hypothesized that creative artistic talent was not unitary or uniform commodity, but are to be accounted for in terms of a large number of factors or primary mental abilities. From what was already known, we should have expected that creative abilities of artists would be found to involve some factors other than those among creative abilities in fields such as science and management. Of the known factors, certain ones of fluency, flexibility, and originality were the most obviously creative abilities. All of them came under a general class of factors known as productive-thinking abilities and in a sub-class of divergent thinking abilities.

A developing system of all intellectual factors indicates the relationships of the more creative factors to one another and to other factors. From certain relationships and parallels, unknown factors that are probably important in the arts can be hypothesized with some confidence. A full account of creative-artistic performance involves evaluative

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[57]J. P. Guilford, "Creative Abilities in Art," Psychological Review, LXIV, No. 2 (1951).

abilities and abilities that are not primarily creative, many of which are already known.

The essence of the creative process is a topic that attracts any person engaged in the study of human emotions, and has become a subject of widespread interest and manifold research approaches. Within the psycholanalytic frame of reference, more than one approach is possible. Although Freud felt that the so-called "higher ego functions" would not lend themeslves easily to psychoanalytic scrutiny, many papers have been written dealing with creativity, most of them primarily concerned with the artist.

Giovacchini[58] investigated the creative process in terms of the ego operations that may facilitate the creative potential, rather than only in terms of specific id factors or neurotic dynamisms and conflict situations. The creative operation of the ego was seen to consist of a balance of primary and secondary processes. This ego had the ability to bind the chaotic impulses emerging from the unconscious, fuse them with external reality, and refine and integrate the product.

Rees and Goldman[59] investigated the relationship between creativity and certain personality factors, using two

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[58]Peter L. Giovacchini, "On Scientific Creativity," Journal of The American Psychoanalytic Association, VIII, No. 3 (1960), pp. 407-426.

[59]Margorie Rees and Morton Goldman, "Some Relationships between Creativity and Personality," Journal of General Psychology, LXV (1961), pp. 145-159.

objective tests. Their purpose was to identify some of the personality characteristics common to creative persons; and to produce some evidence concerning the role of adjustment or maladjustment in creativity and imagination. An attempt was also made to investigate the difference in personality in different fields of creative endeavor, i.e. the arts and sciences. The measure used, in this investigation, to establish criteria of creativity and imagination was a self-report questionnaire, designed to obtain information about the creative works of the subjects. This questionnaire could be scored objectively, and the subject's degree of creativity was inferred from his score. In respect to the purpose of the study, it may be concluded that certain personality factors have been found to be significantly related to creativity in the experimental population. The evidence did not support a relationship between maladjustment and creativity as investigated in this study. The conclusion also indicated that difference in personality constellations existed within different fields of creative endeavor, and that objective personality tests were useful in assessing these differences.

CREATIVITY AND INTELLIGENCE

"Creativity is one of the most highly valued of human qualities. It is also one of the most elusive to systematic inquiry."[60] Question after question go unanswered involving

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[60]Getzel, Jacob W. and Jackson, Phillip W., Creativity and Intelligence. (New York: John Wiley and Sons, Inc., 1962) p. vii.

inquiries of the creative process, creative development, creativity and personality, and creativity and its relationship to intelligence. The concept of intelligence and intelligence measures have been used to define individual differences, intellectual accomplishments, and the I. Q. Individual differences of performances on the intelligence tests have been made synonymous with individual differences in the potential for productive thinking. Therefore, the following studies, of intelligence and creativity, are reviewed with the hope that these studies will yield significant insight into the character of specific processes of creativity and intelligence.

Stein and Meer,[61] in their experiment used ten standard Rorschach Cards as their ambiguous stimuli. Only subject's first responses were scored for the purpose of their experiment. When the stimulus was ambiguous, the perceiver had to draw more heavily on his own stimulus as structured. Consequently, it was hypothesized that those who have such resources available to them ("more creative" subjects) will develop more hypotheses and better Gestalten under varying conditions of ambiguity than those who may not have such resources available to them ("less creative" subjects). Having assigned a score to each response, a total weighted score was established for

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[61]Morris I. Stein and Bernard Meer, "Perceptual Organization in a Study of Creativity," The Journal of Psychology, XXXVII (1954). pp. 39-43.

each of the subjects. A bi-serial correlation between the weighted form-level score and the rating on the creativity variable was +.88, significant at the .01 level. Furthermore, analysis of the difference between mean weighted scores at each of the exposure levels indicated that high and low groups were significantly different from each other beyond the .01 level of confidence, at all four exposure levels.

The overall analysis showed the "high" achieved significantly more well integrated responses than the "low" (.001 level of confidence). Significant correlations were found between the Wechsler-Bellevue Full Scale Scores and creativity and between the Rorschach scores and the Wechsler-Bellevue Full Scale Scores.

A study of measurement of intelligence and creativity by Meer and Stein[62] concerned itself with one aspect, the relationship between intelligence and creativity. The question posed for this study was what is the relationship between intelligence test scores and creativity for a population of subjects actively engaged in research? Sixty-four scientists actively engaged in industrial research were used. The creativity criterion was the ranking of superiors. The Wechsler-Bellevue and Miller Analogies Test were the measures of intelligence. The results obtained in the study

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[62]Bernard Meer and Morris I. Stein, "Measures of Intelligence and Creativity," The Journal of Psychology, XXXIX (1955), pp. 117-126.

were: (1) age, length of service in organization, and total professional experience were not related to creativity; (2) the consolidated analysis revealed a significant relationship between intelligence and creativity. Correlations between various measures of intelligence and creativity were significant at the .05 level and the .01 level.

Buel and Bachner[62] reported that their investigation was to study the descriptive and predictive validity of several psychometric instruments and a locally constructed forced-choice scale. Three criteria of creativity were collected against which the psychometric instruments' validities were calculated. A matrix of intercorrelations among the variables singled out for consideration items as discriminators between relatively creative and non-creative research persons. With regard to the results of the study, subtests which approached significance for one or several criteria, but which have not previously been discussed might bear further scrutiny and item analysis. Stable, Reflective, Objective, Agreeableness (negative), Artistic (negative), and Religious (Negative) might well be developed into a significant indicator of the personality and value structure of creative persons.

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[63] William Buel and Virginia M. Bachner, "The Assessment of Creativity in a Research Setting," Journal of Applied Psychology, XLV, No. 6 (1961), pp. 353-358.

Stein[64] stated in our studying creativity we tend to restrict ourselves to a study of the genius because the "distance" between what he had done and what exists is quite marked. Such an approach caused us to overlook a necessary distinction between the creative product and the creative experience.

Rockwell[65] recognized that creative thought, which he defined rather nebulously as the plus quality, was something more than I. Q. However, he did not extend his consideration to the possibility that this phenomenon might perhaps be something less than I. Q. Although he cited the existence of a great number of graduate students, supposedly with high I. Q.'s, who are not creative, he did not consider those of median I. Q. who are "high" in creativity and imagination.

Thurston[66] writes, "If genius represents extremely high gifts for creative thinking, then it is not synonymous with intelligence." To be extremely intelligent is not the same as to be gifted in creative work. This may be taken as a hypothesis.

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[64]Morris J. Stein, "Creative and Culture," The Journal of Psychology, XXXVI (1953), pp. 311-322.

[65]John G. Rockwell, "Genius and I. Q.," Psychological Review, XXXIV, No. 5 (September, 1927), pp. 377-384.

[66]L. L. Thurston, "Creative Talent," Proceedings of the 1950 Invitation Conference on Testing Problems, Princeton Educational Testing Service (1951).

THE WARTEGG AND THE KINGET DRAWING-COMPLETION TESTS

Wartegg[67] created an instrument in trying to isolate factors of the personality, one such factor was imagination. The rational scoring system, and interpretative principles of Wartegg's Drawing-Completion Tests, described in English by Dr. Marian Kinget, are here presented by the test author. The "diagnosis of a strata" is an attempt to combine for psychodiagnostic purposes some aspects of Pavlovian sensory-physiological reflexology with elements of depth psychology. Wartegg's "graphascopic" analysis of drawing completions incorporates both quantitative and qualitative data. Research findings in child development, vocational guidance, and in the differentiation of psychiatric syndromes were reported. The pre- and post-psychotherapeutic protocols of a case of obsessive-compulsive neurosis were reproduced, scored, and interpreted.

Takala and Hakkarainen[68] investigated factor analysis and the validity of the Wartegg Drawing Test. The test was administered to 1025 subjects, representing seventeen occupations. The results obtained indicated that test differentiated occupational groups and could serve as a

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[67]Ehrig Wartegg, Schictdiagnostik Der Zeichentest (WZT), Einfuhrung in die Experimentelle Graphaskopie, (Gottingen: Verlog fur Psychologie, 1953), pp. 107.

[68]Martti Takala and Marjolta Hakkarainen, "Uber Faktorenstrukur und Validitat des Wartegg-Zeichentest," Annual Academy of Science, Finland, 81 (1) Ser. B. 95.

possible predictor of vocational success. Correlations with intelligence were low, with drawing ability high. Norms for the specific test variables and results of a factor analysis were reported.

Rupiper[69] in a current investigation (1961) of correlation analysis of the Kinget Drawing-Completion Test and other personality measures investigated the imagination and creative portion of the Kinget Test with which this study is concerned. All intercorrelations of the personality characteristics as measured by the Kinget test were positive and statistically significant at the .05 level. Creative imagination and activity traits correlated significantly with thoughtfulness score, as measured by the Guilford-Zimmerman Temperament Survey. Some relationships outside of the imaginative-creative facets were negatively correlated.

In examining a large number of definitions of creativity and imagination, it may be seen that most all of them include the production of something new or original which is the result of a process of sensing some kind of deficiency, formulating ideas, or hypotheses concerning them, testing these hypotheses, and communicating the results. In order to assess the abilities involved in creativity and imagination it is necessary to develop and apply tests which are different

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[69] O. J. Rupiper, "Correlation Analysis of the Kinget Drawing-Completion Test and Other Personality Measures," Unpublished Study, College of Education, University of Oklahoma (1962), p. 23.

from those now commonly used in assessing mental functioning. It appears therefore, that drawings might be a reasonable, stable means of evaluating personality structure; however, little adequate information is given in this regard (outside of the "intelligence" aspect of personality) in psychological literature.

CHAPTER III

DESIGN AND PROCEDURE

SELECTION OF SUBJECTS

The nature of the population sample used in an investigation determines much of the significance of the results of that investigation. The age, school class level, and intelligence were three of the more obvious factors considered in this sampling procedure. To eliminate the possibility of a test of age differences, it was desirable to use either a sample as heterogeneous as possible in regard to chronological age, or a sample of different ages; for this investigation different ages were more conveniently utilized. Although the composition of the sample could not be readily controlled to obtain a heterogenous sampling of any one grade in the high school population, at least approximately an equal number of subjects from each grade level was obtained.

SUBJECT SAMPLE

In order to assure, as far as possible, the independence of creativity and imagination, personality and intellectual characteristics, and the subjects' interest patterns under

investigation, it was necessary to select tests of those characteristics that were readily available, reliable, and well standardized, but even more important, tests that provided measurements of relatively independent factors.

The tests that most nearly fulfilled the necessary qualifications were: Kinget's Drawing-Completion Test, Guilford-Zimmerman Temperament Survey, The Kuder Vocational Preference Record, and the Otis Quick Scoring Mental Ability Test. Therefore, for the purpose of this study, and to obtain a random selection of subjects, a total of 905 students enrolled in the tenth, eleventh, and twelfth grades at the Ardmore High School, Ardmore, Oklahoma were given the Kinget Drawing-Completion Test, the Guilford-Zimmerman Temperament Survey, and the Kuder Vocational Preference Record. These tests were administered in seventy-five regular class sessions with classes scheduled at various times of the day, during the fall of the school year 1963-1964. The Kinget Test, measuring creativity and imagination, was administered first. Not all of the 905 students were present for all sessions; resulting in the failure of some to complete the entire test battery. All students with an incomplete battery of tests were rejected. The selection of the sample of one hundred and ninety-five (195) subjects was made on the basis of intelligence scores taken from the cumulative record files of each subject: the gifted whose I. Q. fell between the limits of 130 and above, 85 I. Q. and below for

the non-gifted subjects, as isolated by the Otis Quick Scoring Mental Ability Test; and the completion of the battery of the three tests above. Random sample was then made to obtain the 195 subjects for the investigation. The general results of the selection procedure were a median age of sixteen and one-half years, for each group the total age range of the sample was from fifteen years to eighteen years. The results of age and sex distribution for the non-gifted group can be found in Table I; and the age and sex distribution for the gifted group can be found in Table II. The total number of subjects and their I. Q.'s for the non-gifted group can be found in Table III; the same information pertaining to the gifted group can be found in Table IV.

TABLE I

AGE AND SEX DISTRIBUTION OF THE NON-GIFTED SUBJECT SAMPLE

Age	Male	Female
18	15	10
17	20	11
16	15	12
15	6	5
Totals	56	38

TABLE II

AGE AND SEX DISTRIBUTION OF THE GIFTED SUBJECT SAMPLE

Age	Male	Female
18	9	11
17	19	21
16	16	7
15	9	9
Totals	53	48

TABLE III

NUMBER OF SUBJECTS AND I. Q. DISTRIBUTION OF THE NON-GIFTED GROUP

I. Q.	Number of Subjects
85	49
84	6
83	4
82	4
81	1
80	10
79	6
78	0
77	2
76	1
75	2
74	1
73	2
72	0
71	0
70	0
69	1
68	0
67	1
66	0
65	0
64	3
63	0
62	0
61	1
Total	94

TABLE IV

NUMBER OF SUBJECTS AND I. Q. DISTRIBUTION OF THE GIFTED GROUP

I. Q.	Number of Subjects
147	2
146	0
145	2
144	1
143	1
142	0
141	0
140	0
139	1
138	2
137	5
136	3
135	6
134	10
133	10
132	14
131	18
130	26
Total	101

ADMINISTRATION OF TESTS

ADMINISTRATION OF THE KINGET DRAWING-COMPLETION TEST

A major concern in the design of this investigation was the use and limitations of the Drawing-Completion Test. Fortunately, Kinget's test was readily adaptable for group administration, and therefore, offered an economy in both the time and effort involved in obtaining the necessary data. The simple construction and organization of the test material and the instructions for its administration largely accounted for this adaptability. There was, however, a necessity for controlling certain factors present in the group administration of a test of this type. Inasmuch as the test evaluates the individual's own personality structure, such things as copying and imitating the drawings of others needed to be discouraged and controlled. Therefore, a proctor assisted the administrator with the testing. Some subjects required encouragement and an opportunity to do their best.

Inquiry Sheet

In order to determine the presence or absence of any significant difference in drawing abilities, interest, training, or experience, it was necessary to select a questionnaire for each subject to record his responses to these questions. The responses of the questionnaire were tabulated for all subjects. The results of the tabulations for question one

and question two of the questionnaire for the non-gifted group are found in Table V; the same information for the gifted group can be found in Table VI. The more significant questions of the inquiry sheet are listed below; the complete inquiry sheet can be found in Appendix A.

1. Is drawing one of your hobbies? _____
2. Have you had any training in art? _____ If yes, how much and to what extent? _____

   _____
3. What things do you usually draw? _____

   _____
4. Do you prefer a certain type of drawing or art? _____ If yes, what kind? _____
5. What drawing do you like best? _____
6. Which drawing do you like least? _____
7. Which sign was easiest to complete? _____
8. Which sign was the most difficult? _____

TABLE V

SUBJECTS' RESPONSE TO QUESTION ONE AND QUESTION TWO FROM QUESTIONNAIRE BY SEX FOR THE NON-GIFTED GROUP

Questions	Male		Female	
	Yes	No	Yes	No
1. Is drawing one of your hobbies?	13	43	5	33
2. Have you had any training in art?	30	26	18	20

The art training received by the thirty males and eighteen females responding to yes for question two was in elementary school; with the thirteen males and five females having had additional art training in high school.

TABLE VI

SUBJECTS' RESPONSE TO QUESTION ONE AND QUESTION TWO FROM QUESTIONNAIRE BY SEX FOR THE GIFTED GROUP

Questions	Male		Female	
	Yes	No	Yes	No
1. Is drawing one of your hobbies?	11	42	11	37
2. Have you had any training in art?	38	16	37	11

The art training received by the thirty-eight males and thirty-seven females responding to yes to question two was in elementary school; with the eleven subjects of each sex having had additional art training in high school.

Administration of the Guilford-Zimmerman Temperament Survey and Kuder Vocational Preference Record was done according to the testing procedure set out in those two respective test manuals. The subject's attitude was generally one of permissiveness and cooperation; the subjects generally appeared interested in the test situation.

MATERIALS

The subjects were provided with materials similar to those in Appendix A. The three printed test materials, an inquiry sheet, two IBM electrical scoring answer sheets, a scoring sheet and profile sheet for the Drawing-Completion Test, a drawing pencil, and a special pencil for recording responses on the IBM scoring sheets. Both pencils were equipped with erasers. The main item of the printed material was the copy of the Kinget Drawing-Completion Test Blank. The second item of test material consists of an inquiry sheet requesting information about the drawings. The third item of test material was the Guilford-Zimmerman Temperament Survey. The fourth item of the test material was the IBM electrical scoring answer sheet for the Guilford-Zimmerman. The fifth item of the test material was the Kuder Vocational Preference Record. The sixth item of the test material was the IBM electrical scoring answer sheet for the Kuder.

CHAPTER IV

STATISTICAL TREATMENT OF DATA

The primary purpose in treating data is to give some indication of meaningfulness to these data. The major purpose of this study was to assess creativity and imagination between gifted and non-gifted students, and vocational preference between gifted and non-gifted students. Null hypotheses were formulated for the three areas tested. The statistical model selected to test the sample of the observed mean difference was the *t* test.

Means and standard deviations were computed for all experimental variables for the gifted group and for the non-gifted group. Raw scores on each of the twenty-three variables were used in the computations. Computations of the means, standard deviations, F-ratio, and *t* tests were done on an IBM 1410 Data Processing System.

Since this study hypothesized no mean differences between the two experimental groups, the appropriate statistic to test the hypothesis was the *t*-test. It was assumed that it is unnecessary to subdivide the two groups into subgroups by stratification. It was assumed that no correlation

existed in drawing the sample groups. It was assumed that the population variates were normally distributed.

To determine the particular $\underline{t}$ test to use, F ratios were computed for each variable. If it were impossible to prove at the five per cent level that a single population variance does not exist, a $\underline{t}$ test using pooled variance could be used. A variance ratio would give this test of single population variance at the five per cent level of significance. The formula for testing the variance employed a variance ratio as follows:

$$F = \frac{S_g^2}{S_1^2}$$

Where S_g^2 was the variance in the sample groups with the greater variance and S_1^2 was the variance in the sample groups with the lesser variance. The degrees of freedom were $n_g - 1$ and $n_1 - 1$.

On all variables for which the F ratio did not exceed the five per cent level of confidence, it was assumed that a single population variation existed. Therefore, a $\underline{t}$ test using pooled variance was used. The formula for $\underline{t}$ was:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where $\bar{X}$ was the mean for the sample. The formula for S was the square root of:

$$S^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

where S_1^2 was the variance of group one and S_2^2 was the variance of group two. The above formula evaluates not only the difference between two means but also the difference between the two variances.[70] The pooled variances *t* test was used with the sample groups of unequal size, unless the differences were extreme.

The degrees of freedom in evaluating a *t* score from pooled variance is $n_1 + n_2 - 2$. For this study the two experimental groups consisted of ninety-four and one-hundred one subjects. Therefore, the degrees of freedom by pooled variance were 193.

For those variables which yielded an F ratio significant at the five per cent level of confidence, a *t* test using separate group variance was used. The formula was:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

where $\bar{X}$ represents the group mean and S^2 the group variance. As suggested by Wert, *et. al.*, the degrees of freedom were determined by the midpoint between degrees of freedom for each sample, $n_1 - 1$ and $n_2 - 2$.[71] The two values were 100

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[70] J. E. Wert, *et.al.*, Statistical Methods in Educational and Psychological Research, p.135.

[71] *Ibid.*

and 93; therefore, the number 97 was used in this study for determining t values.

In addition to treating and analyzing the data on personality as described above, the investigator subjected other available data to such further treatment and analysis as was deemed to be of interest as the study progressed. The two groups, the gifted and the non-gifted, were compared in terms of their scores in various combinations of variables from the three evaluating instruments.

KINGET DRAWING-COMPLETION TEST

For both groups, the gifted and the non-gifted, one hundred ninety-five papers were scored, using an initial set of criteria based on an interpretation of Kinget's criteria. Scoring was computed in the two sub-variables, "Combinative Imagination" and "Creative Imagination"; both scores contributed to the total score of "Imagination." An outline of Kinget's personality of these variables will be found in Figure 1.

FIGURE 1

SCORING AND PROFILE VARIABLES USED IN THE KINGET PERSONALITY SCHEMA OF IMAGINATION

Combinative Imagination	Creative Imagination
Physiognomy	Expansion
Ornaments	Fantasy (Fancy, Phantasm, Symbolism)
Style	Originality
Organization	Asymmetric Abstractions (Technical)
Symmetric Abstraction	Dark Shading

Kinget proposed that her criteria and method were objective; however, when the subjective nature of drawings and the subjectively involved in their evaluation are considered, it becomes necessary to obtain an index of the scoring reliability of the scoring criteria when used by a single evaluator. If such reliability is low, then means should be taken to insure an adequately high degree of stability in the use of the criteria. Consequently, an attempt was made to obtain an adequately stable set of criteria, the result of which was more objective and definite categorization of the various values for the scoring of "Imagination" than presented by Kinget.

The criteria finally devised for use in this investigation will be found in Appendix B. The test papers of the two experimental groups, the gifted and the non-gifted, were hand-scored one at a time. Scores for each sub-variable were computed to a single score for the profile variable "Imagination." The test of significance (t) on these scores were computed, the means were obtained from the raw scores.

OTHER EVALUATING INSTRUMENTS

In order to test the null hypotheses that there are no statistically significant differences existing between the gifted group and the non-gifted group on each of the ten Guilford-Zimmerman Temperament Survey variables, an F-ratio and t test were computed for each variable. A single score

for each individual on each variable was obtained. These raw scores were used in the computation of these two statistics.

The F-ratio and *t* test were computed for each of the ten variables of the Kuder Vocational Preference Record, in order to test the null hypotheses that there are no statistically significant differences existing between the gifted group and the non-gifted group. A single score for each individual, for each variable was obtained. These raw scores were used in the computation of the statistics.

CHAPTER V

RESULTS OF THE INVESTIGATION

A presentation of the results of this investigation will be found in the following discussion. Raw scores for all variables were used in the computation of the statistics. The means and standard deviations for the two experimental groups and the F ratios and the t tests between groups were obtained through the use of an IBM 1410 Data Processing System.

To reject a null hypothesis, the resulting F or t test had to be significant at the .05 level of confidence. If the obtained F or t tests were not significant at the .05 level of confidence, the hypotheses were accepted. This level of significance was used for all variables of the three evaluating instruments.

This presentation concerns the following points:

1. The difference between the gifted group and the non-gifted group in respect to personality variables,
2. The difference between the gifted group and the non-gifted group in respect to vocational preference,

3. The difference between the gifted and the non-gifted group in respect to creativity and imagination.

Data on Personality

Personality behavior was assessed by the Guilford-Zimmerman Temperament Survey. This instrument contains ten variables or traits as follows: General Activity (G), Restraint (R), Ascendance (A), Sociability (S), Emotional Stability (E), Objectivity (O), Friendliness (F), Thoughtfulness (T), Personal Relations (P), and Masculinity (M). The means and standard deviations for both groups are reported in Table VII.

Observed differences were found in the means and standard deviations between the two experimental groups on the ten variables. The t test was used to assess the significance of these differences. Analysis of the data will test Hypothesis three, that there is no statistically significant mean difference in personality behavior between the gifted and the non-gifted high school students, as measured by the Guilford-Zimmerman Temperament Survey. The obtained t scores and F ratios for each of the ten personality variables are given in Table VIII.

One variable of the Guilford-Zimmerman Temperament Survey exceeded the five per cent level of significance, variable F -- Friendliness. For this variable the t test formula for separate group variance was used. For the other nine variables, the formula for pooled variances was employed.

TABLE VII

MEANS AND STANDARD DEVIATIONS FOR THE GIFTED GROUP AND THE NON-GIFTED GROUP ON THE TEN GUILFORD-ZIMMERMAN TEMPERAMENT SURVEY VARIABLES

Personality Variable	Gifted (n = 101)		Non-Gifted (n = 94)	
	Mean	S. D.	Mean	S. D.
G	16.38	5.89	16.52	5.26
R	13.89	5.30	12.05	4.34
A	13.47	5.36	13.17	4.61
S	16.85	6.43	17.00	6.06
E	14.51	5.37	12.93	5.11
O	13.74	5.65	12.23	5.55
F	12.86	5.51	10.93	4.48
T	16.90	5.75	16.03	5.76
P	15.37	5.63	12.98	5.17
M	15.75	6.43	13.75	6.95

TABLE VIII

F RATIOS AND t TEST BETWEEN THE GIFTED GROUP AND THE NON-GIFTED GROUP ON THE TEN VARIABLES OF THE GUILFORD-ZIMMERMAN TEMPERAMENT SURVEY

Personality Variable	F Ratios			t Test		
	d.f.	F	p	d.f.	t	p
G	100,93	1.250	---	193	.168	---
R	100,93	.595	---	193	2.636	.01
A	100,93	.289	---	193	.424	---
S	100,93	1.120	---	193	.165	---
E	100,93	.137	---	193	2.096	.05
O	100,93	.863	---	193	1.877	.05
F	100,93	2.969	.01	97	2.689[a]	.01
T	93,100	.505	---	193	1.053	---
P	100,93	1.232	---	193	3.079	.01
M	93,100	1.353	---	193	2.082	.05

[a] t test using separate group variance.

Six personality variables yielded t values significant at the .05 level. These were Restraint (R), Emotional Stability (E), Objectivity (O), Friendliness (F), Personal Relations (P), and Masculinity (M). The null hypothesis of no significant difference between the two experimental groups was rejected for the above variables. The remaining four personality variables, General Activity (G), Ascendance (A), Sociability (S), and Thoughtfulness (T) yielded t values which were not significant at the .05 level of significance. Therefore, the null hypothesis of no mean difference was accepted. For the last four named variables, the observed mean differences, as shown in Table VII, are chance differences and are not statistically significant.

Since six of the ten personality variables as measured by the Guilford-Zimmerman Temperament Survey were significant, the general hypothesis for personality was rejected. Hypothesis three stated there is no statistically significant mean difference in personality behavior between the gifted and the non-gifted high school students. Therefore, the four variables of the Guilford-Zimmerman Temperament Survey that both groups do not differ significantly will be examined independently to indicate why the two groups were similar.

The variable General Activity (G), indicates strong drive, energy, vitality, and activity qualities which are possessed by all students of thesame age group as the subjects of this study. Behavior by a young person, contributing to

the qualities above, would thus indicate the possibility of need for observation and possibly medical care. Therefore, similarities of the two groups in General Activity, is normal and any deviation from the established qualities would be abnormal.

The variable Ascendance (A), is a relative matter, and the need for it varies according to personalities. Playing a submissive role and wanting to follow the leadership of others in social situations, selecting vocational goals below his ability level, avoiding assuming managerial or professional responsibilities are traits possessed by both the gifted and the non-gifted groups to some degree. Therefore, both groups do not differ significantly with respect to each other on the variable Ascendance.

The variable Sociability (S), is the trait of social participation, at both ends of the intellectual continuum, involving the high gifted group and the low non-gifted group, are individuals who are withdrawn and reserved, and hard to get to know. These segments of each group are in many ways regarded as catalyzers for the remaining individuals in each group who are sociable, outgoing, and cordial individuals.

The variable Thoughtfulness (T), involves one's thoughts and his concern for others. The age of the subjects classifies each as a teenager, whose life is subjected to that of his peers. In many instances this type of individual is so busy interacting with his social environment that he is a poor

observer of people. This type of person is not subtle and lacks tact. He dislikes reflection and planning outside the realm of his peer group. Therefore, with the exclusion of a selected few, both groups possess the variable thoughtfulness.

The data in Table VIII indicate the variable Restraint (R) had a significant difference between the gifted and the non-gifted groups. By examining the means in Table VII, the gifted group was found to score higher, indicating that the non-gifted students are more apt to be more impulsive, care-free, excited, and happy-go-lucky; whereas, the gifted students are more serious minded, persistent, deliberate, and possess more self-control.

The difference of the mean of the groups on the variable Emotional Stability (E), as observed in Table VIII, reveals that the gifted group had a somewhat higher score and gives evidence of a tendency toward greater stability of moods and interest, cheerfulness, and optimism. By the same token, the gifted group would appear to be somewhat more prone to fluctuation of moods and interests, pessimism, and gloominess. The numerical difference between the two groups is not sufficient to raise a serious question about aggressive goal planning. The higher mean score of the gifted group thus suggests that this group is somewhat more stable emotionally than the non-gifted group as a whole.

The groups differ significantly on the variable Objectivity (O), here one has the tendency to view oneself and

environment objectively and dispassionately. The gifted group's higher mean score, as observed in Table VII, indicates that the non-gifted group possesses more egoism, touchiness, or hyper-sensitivity.

The mean score in Table VII indicates that the variable Friendliness (F) also differentiates the groups. There was a difference in agreeableness, hostility, and belligerence. The gifted group lacked fighting tendencies to the point of a healthy, realistic, handling of frustrations and injuries. The non-gifted group possessed hostility in one form or another, or a fighting attitude.

The variable Personal Relations (P), has consistently correlated highest with all criteria involving human relations. It seems to represent the care of getting along with others. The high mean score of the gifted group as displayed in Table VII indicates tolerance and understanding of other people and their human weaknesses. The low mean score indicates fault-finding and criticalness of other people and institutions generally.

The difference in the mean scores of the gifted and non-gifted groups on the variable Masculinity (M), indicates the gifted group may be regarded as more masculine in interest and temperament, according to our cultural stereotypes of masculinity, than the non-gifted group.

These results are somewhat puzzling, particularly in view of their being high statistical significance. The

Masculinity scale of the Guilford-Zimmerman Temperament Survey contains items dealing with interests, activities, vocations, and emotional behavior associated with males in our culture. The concept of masculinity, however, is often linked with such attributes and values as strength, virility, and a sense of adequacy. Cameron and Margaret, in discussing the young boy's identification with the male role, point out:

> "He learns to value highly the things he can do and the things he must learn to do as a little man, and to disparage the domestic and maternal achievements of his sister. He is taught the social implications for him of such terms as manly, strong, smart, good, brave, and independent, and of sissy, weakling, dumb, slow, scared, and mama's boy."[72]

On the basis of the available data, it would not be defensible, of course, to assume that the Masculinity scale or any single scale or combination of scales of the Guilford-Zimmerman Temperament Survey necessarily measures the individual's sense of personal adequacy. Responses to an objective, questionnaire-type personality inventory may be presumed, however, to give us some idea of the respondent's self-concept, i.e., how he actually sees himself in terms of attitude, values, personal attributes, etc. It would be reasonable to expect that a group of people aspiring to relatively high goals would regard themselves as suited to such aspirations. Their responses to a personality inventory might be expected to

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[72] N. Cameron and A. Magaret, Behavior Pathology, (Boston: Houghton Mifflin Co., 1951), p. 104.

reflect a self-concept characterized by a tendency toward favorable mean scores. This suggests that the gifted may have some awareness of their personal limitations and lack of fitness for the goals they are considering. On the basis of the data at hand, attempts to explain the tendency to select inordinately high goals would unfortunately be speculative.

The Data on Vocational Preference

The instrument utilized to assess vocational preferences was the Kuder Vocational Preference Record. Preferences in ten broad areas were measured. These were: Outdoor (0), Mechanical (1), Computational (2), Scientific (3), Persuasive (4), Artistic (5), Literary (6), Musical (7), Social Service (8), and Clerical (9). Null hypotheses of no significant differences between means of the two experimental groups were treated for each of the above ten vocational preference variables.

It should be recalled, at this point, that the statistical procedures applied to the data for these variables were identical with those used on the personality variables. Means, standard deviations, F ratios, and *t* tests were employed to compare the various groups and to determine if any statistically significant differences were present. In Table IX are reported the means and standard deviations for the two experimental groups on the vocational preference variables.

TABLE IX

MEANS AND STANDARD DEVIATIONS FOR THE GIFTED GROUP AND THE NON-GIFTED GROUP ON THE TEN KUDER VOCATIONAL PREFERENCE RECORD VARIABLES

Vocational Preference Variables	Gifted (n = 101)		Non-Gifted (n = 94)	
	Means	S. D.	Means	S. D.
0	38.15	15.30	39.40	14.61
1	33.27	15.33	34.50	13.14
2	26.10	9.16	25.73	8.88
3	39.51	14.02	37.32	13.14
4	38.97	13.28	39.20	9.90
5	28.03	10.54	29.30	9.93
6	21.55	7.77	18.38	7.08
7	14.35	9.44	13.78	5.70
8	40.29	14.02	42.73	13.54
9	50.30	14.37	53.13	14.83

Observed differences were found in the means and the standard deviations between the two experimental groups. The *t* test was used to assess the significance of these mean differences. Analysis of the data will test Hypothesis Two that there is no statistically significant mean differences in vocational preference between the gifted and the non-gifted high school students. In Table X are reported the F ratios and the *t* values for each of the ten vocational preference variables.

TABLE X

F RATIOS AND t VALUES BETWEEN THE GIFTED AND THE NON-GIFTED GROUPS ON THE TEN VARIABLES OF THE KUDER VOCATIONAL PREFERENCE RECORD

Vocational Preference Variable	F Ratios			t Test		
	d.f.	F	p	d.f.	t	p
0	100,93	1.095	---	193	.580	---
1	100,93	1.362	---	193	.595	---
2	100,93	1.063	---	193	.289	---
3	100,93	1.138	---	193	1.120	---
4	100,93	1.796	.01	97	.138[a]	---
5	100,93	1.126	---	193	.863	---
6	100,93	1.204	---	193	2.969	.01
7	100,93	2.743	.01	97	.514[a]	---
8	100,93	1.071	---	193	1.232	---
9	93,100	1.065	---	193	1.353	---

[a] t test using separate group variables

Two vocational preference variables, four and seven, as shown in Table X, had significant F ratios. Therefore, the t test formula using separate group variance was used. The remaining eight variables were tested by the t test formula with pooled variables.

The null hypotheses were accepted for nine of the ten vocational preference variables. Thus, there was no statistically significant difference between the gifted and the non-

gifted students on the variables, Outdoor, Mechanical, Computational, Scientific, Persuasive, Artistic, Musical, Social Service, and Clerical. Since the Kuder Vocational Preference Record is an assessment of preference and not an ability or aptitude test, and since the subjects have had limited work experience, similarities between the two experimental groups on the nine variables is to be expected. Therefore, the general hypothesis (Hypothesis Two) was accepted.

Only one vocational preference variable was found to show a significant difference between the means of the two experimental groups. This was the variable Literary (6). Interpretation of this variable is that a high score indicates a preference for reading and writing. Table IX showed that gifted students scored higher than non-gifted students. This finding is supported by the students' school environment. As they progress in school years, reading becomes more time-consuming part of their school day. Students are usually expected to demonstrate reading and writing skills as they move to higher grades. For the low-ability students, reading and quality writing becomes a serious problem and a probable threat to their success in high school. It is understandable why the non-gifted would be less interested in literary activities.

The Data on Creativity and Imagination

The Kinget Drawing-Completion Test was administered to the experimental groups to assess imagination and creativity. Three scores from this instrument were used in this study. The three variables were Combinative Imagination, Creative Imagination, and a combination of the two Total Imagination. Null hypotheses of no significant differences between the means of the two experimental groups were tested for each of the three variables.

From raw scores, the mean, standard deviations, F ratios, and appropriate t tests were computed for each variable. The results are reported in Table XI and Table XII.

TABLE XI

MEANS AND STANDARD DEVIATIONS FOR THE GIFTED GROUP AND THE NON-GIFTED GROUP ON THE KINGET DRAWING-COMPLETION TEST VARIABLES

	Gifted (n = 101)		Non-Gifted (n = 94)	
Variables	Mean	S. D.	Mean	S. D.
Combinative Imagination	33.13	20.40	18.90	11.94
Creative Imagination	27.95	22.17	16.62	9.48
Total Imagination	61.08	41.31	35.53	19.64

Marked differences were observed between the means of the two groups. However, Table XI showed a large standard deviation for each group and variable. The t test was used to test Hypothesis One of no statistically significant mean difference in creativity and imagination between the two experimental groups. As could be anticipated from the means and standard deviations, statistically significant F ratios were found for all three variables. Consequently, the t test formula for separate group variance was used. Results are given in Table XII.

TABLE XII

F RATIOS AND t VALUES BETWEEN THE GIFTED AND NON-GIFTED GROUPS ON THE KINGET DRAWING-COMPLETION TEST VARIABLES

	F Ratios			t Test		
Variables	d.f.	F	p	d.f.	t	p
Combinative Imagination	100.93	2.918	.01	97	5.888	.01
Creative Imagination	100.93	5.465	.01	97	4.576	.01
Total Imagination	100.93	4.421	.01	97	5.450	.01

The extremely high t values rejected the null hypotheses of no significant mean differences for each of the three creativity and imagination variables. Therefore, the general null hypothesis, Hypothesis One, was rejected.

The combinative type of imagination draws its material directly from the surroundings, organizes it according to objective standards, and produces forms which fit in the world of sensorial experience. This kind of imagination is thus essentially based on perception and oriented towards visible reality. This type of imagination contains six variables: Physiognomy, Ornaments, Style, Organization, and Symmetric Abstraction (see Figure I), which are scored according to the criteria in Appendix B. This score of each of these variables was of appreciable help in subsequent analysis of the profile.

To summarize, the gifted group and the non-gifted group in the above six variables: The gifted group's imagination and creativity showed that, far from representing a threat to their reality functioning, is strongly developed, its significance is thoroughly positive, enhancing their sensibility and fostering their activity. The non-gifted group presents a structure and evidenced weakness of the reality component. Examination of their drawings revealed that their score refers solely to elaboration in plane, not to a linear perspective. This indicates that the non-gifted group's speculativeness consists more of day-dreaming than of productive logical thinking, lack of common sense, practicality, and masculine interests.

The creative kind of imagination is characterized by the looseness of its contact with visible reality and by its

preference for abstract constructs or for symbols of an emotional, philosophical, or mystical sort. This type of imagination contains five variables: Expansion, Fantasy (including Fancy, Phantasm, and Symbolism), Originality, Asymmetric Abstraction, and Dark Shading (see Figure 1). The difference between the gifted and the non-gifted groups in these latter five variables was revealed by the results which indicated the gifted group's imagination has a largely intellectual composition, this appeared from the significant weight of the score for Originality. The absence of Fancy and Phantasm underscores the realistic and sound character of the gifted group's creative imagination. The consistently high scoring shows that the gifted group is neither conventional nor unconventional, but considering the total picture of indexes, the gifted group is healthily personal. The non-gifted group's quality of drawings over-all was low, lacked good planning and careful execution. Their drawings were more Physiognomy than Expansion. The indexes suggest the non-gifted group's imagination is oriented toward more personally important goals, the gifted group's more impersonal and broader objectives. The comparison of the two experimental groups on the latter five variables shows the difference between the groups; the gifted group's drawings agrees with the above-mentioned inference and shows the gifted group to be imaginative, creative, intellectually and emotionally more refined.

CHAPTER VI

DISCUSSION OF THE RESULTS

The purpose of this study was to explore possible differences between two intellectual groups, the gifted and the non-gifted high school students, with respect to Imagination and Creativity, personality traits, and vocational preferences. The dearth of experimental data in the area of special abilities, and in particular creativity and imagination, invited this research. However, except for measures of minimum capacities, which may be acquired by learning as well as by natural gift, measurement of the phenomenon creativity and imagination have been extremely difficult to formulate. Thus, we will understand creative imagination insofar as we are able to isolate and identify the traits or factors characteristic of it. In terms of this purpose, the writer feels that the overall results of this investigation are essentially positive.

The results of this study in regard to Kinget's proposed characteristics of Imagination are of considerable interest. There appear to be several factors of critical importance for Imagination and Creativity. These are the factors of the "combining" type of imagination that draws

its material directly from the surroundings, organizes it according to objective standards, and produces forms which fit into the world of sensorial experience. This kind of imagination is thus essentially based on perception and oriented towards visible reality. It may also present a fairly emotional undercurrent, as manifested in its products which often show an aesthetic tendency, though of a conventional variety. The "creative" kind of imagination is characterized by the looseness of its contact with visible reality and by its preference for abstract constructs or for symbols of an emotional, philosophical, or mystical sort. A touch of creative imagination is likely to enhance the personality and may be highly valuable in certain spheres of activity; however, a marked predominance of this kind of imagination is likely to be an obstacle to adjustment to ordinary life. Therefore, the goal-directed manipulation of a wide variety of relationships in a novel or original manner may result in the development of new and stable relationships, products, or techniques. Such a process fulfills the specifications for the imaginative process as proposed by Spearman, Ribot, and Hutchinson.

Significant differences were found between the gifted and the non-gifted groups in the imagination and creative variable of the Kinget Drawing-Completion Test.

A comparison of the total mean scores on all the imagination variables for the gifted group, and those of the

non-gifted group, on the Kinget Drawing-Completion Test show the gifted group to have somewhat higher mean scores. If it can be assumed that the gifted student population as a whole is somewhat superior in creative and imaginative abilities to the non-gifted student population, this superiority in mean scores suggests that these non-critical factors may be, as seems to be the case in regard to the intellectual factors that comprise general intelligence, necessary but not sufficient factors for creative production. In any practical application of the knowledge of the intellectual factors contributing to creative production, it would be highly desirable to include the necessary but not sufficient factors. For this reason, an extension of this study to include a sample of the normal population would be of considerable value. At the present time it appears that a process similar to the one discussed in the preceding paragraph may well be what distinguishes the gifted from the non-gifted yet highly creative individual.

There are a number of significant personality differences between the gifted and the non-gifted groups. In terms of the results of this study, the non-gifted individual appears to be withdrawn and an unsophisticated person who is less interested in people than in things, yet despite a relatively high degree of self-sufficiency and independence, he is somewhat insecure. As suggested previously, it may be reasonable to expect that the non-gifted individual's preoccupation with

things and disregard of people allow him considerably more time and energy to devote to his activities and in this event the activities are likely to become a substitute for social activities.

A comparison of the scores of the gifted group and the non-gifted group with the scores of the normal standardization population on the Guilford-Zimmerman Temperament Survey indicate relatively minor differences, but they do not constitute deviations from the normal.

There were observed differences found between the gifted group and the non-gifted group in their preferences as assessed on the Kuder Vocational Preference Record. In terms of the results of this study, the two groups were similar on all variables except the variable, Literary, which indicates a preference for reading and writing. The gifted students scored higher on this variable than did the non-gifted. This finding is supported by the students' environment. As they progress to a higher grade their reading and writing facility is demonstrated. For the non-gifted group, the low score indicates reading and quality writing are a serious problem and a constant threat to their success in high school. For this reason, it would be very understandable why the non-gifted group would be less interested in literary activities.

Final analysis of the results of this study indicates that Hypothesis One, there are no statistically significant mean differences in imagination and creativity as measured

by The Kinget Drawing-Completion Test for the gifted and non-gifted high school students, and Hypothesis Two, there are no statistically significant mean differences in interest patterns between the gifted and non-gifted high school students, as measured by The Kuder Vocational Preference Record, were rejected; and Hypothesis Three, there are no statistically significant mean differences in personality behavior between the gifted and non-gifted high school students as measured by The Guilford-Zimmerman Temperament Survey, was accepted.

CHAPTER VII

SUMMARY AND CONCLUSION

Most studies of creativity and imagination have been of a speculative nature and few experimental investigations have been reported in the psychological literature. The purpose of this study was to explore the difference between two intellectual groups, the gifted and the non-gifted high school individuals.

The subjects were high school students, with approximately an equal number from each grade level, and approximately an equal number from each sex. The selection of the subjects was made on the basis of intelligence scores taken from the cumulative record files of each subject: the gifted classified as those whose I. Q. fell between the limits of 130 and above, 85 I. Q. and below for the non-gifted subjects, as isolated by the intelligence test The Otis Quick-Scoring Test of Mental Ability. Random sampling was made to obtain the subjects for the investigation. The subjects were administered a series of tests, designed to measure creativity and imagination, personality characteristics, and vocational preferences. The Kinget Drawing-Completion Test was given to assess creativity and imagination; the Guilford-Zimmerman Temperament Survey

was administered to measure the personality traits of the subjects; and the Kuder Vocational Preference Record was given to the subjects to determine their vocational choices.

The difference between the two groups was discerned by the t test of the group means on variable of the three instruments administered. The results of the study suggest the following conclusions:

1. There seem to be significant differences between the gifted and the non-gifted groups in creativity and imagination, on the commonly accepted factor that comprises general creativity and imagination.
2. Creativity and imagination does seem to be related to commonly accepted factors that comprise general intelligence in the experimental population (a group of gifted and a group of non-gifted high school students.)
3. Apart from their classification as gifted and non-gifted, the non-gifted group were significantly less stable and controlled, more sensitive emotionally, and more insecure and tense than the gifted group.
4. There was a significant difference between the gifted and the non-gifted on the personality assessment.
5. No significant difference was found between the two groups in respect to their vocational choice, as determined by the vocational record.

6. Further investigation is needed in the area of the construction and in the development of more refined scoring procedures on test of factors that may be involved in creativity and imagination.
7. An investigation of the effect that motivational factors may have upon creativity effort would be of considerable importance.

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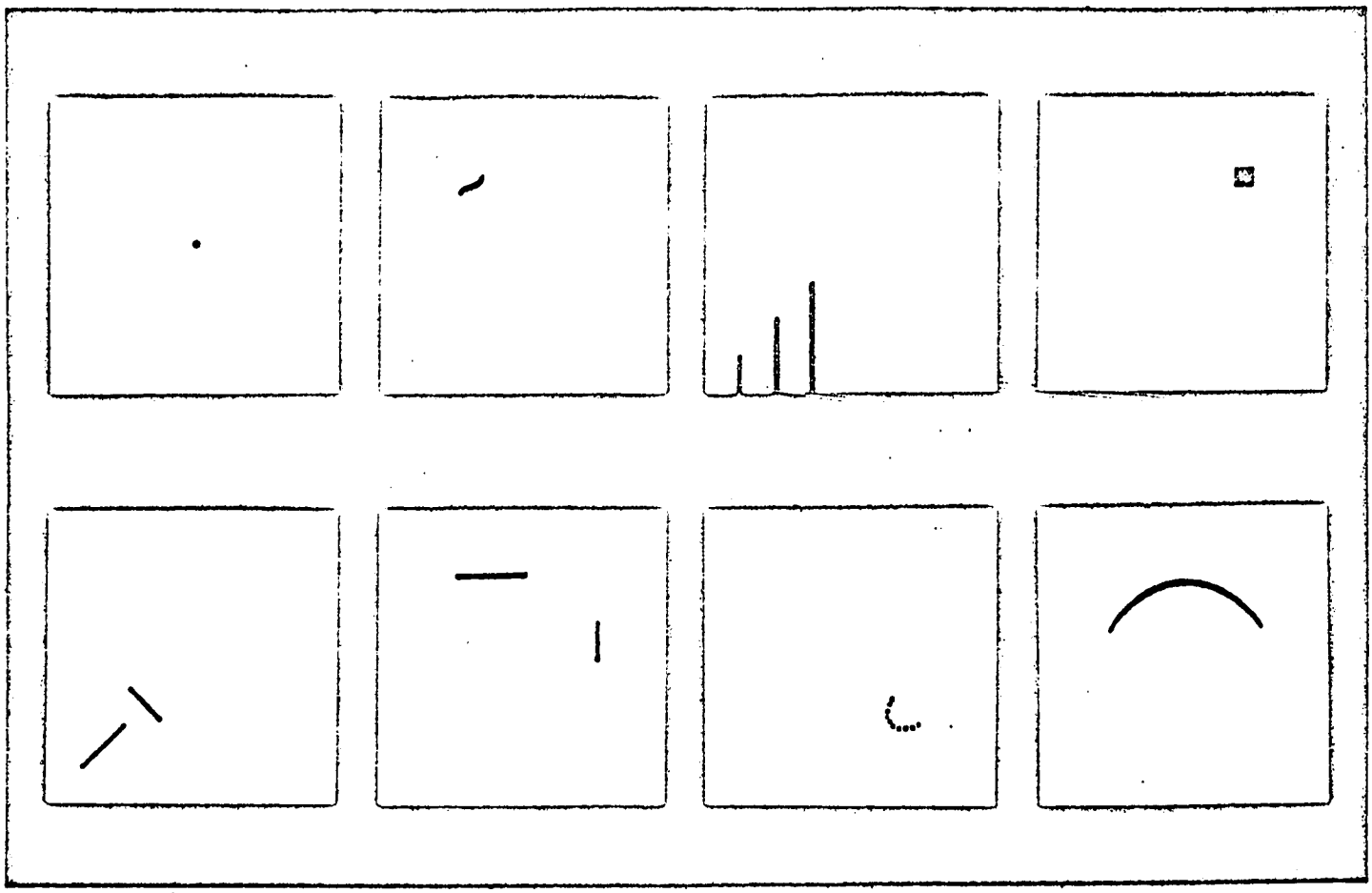
APPENDIX A

MATERIAL USED IN INVESTIGATION



KINGET DRAWING-COMPLETION TEST

CRITERIA		Total Score	Drawings 1	2	3	4	5	6	7	8	Drawings 1	2	3	4	5	6	7	8	Total Score	CRITERIA	
NATURE	Animate																			Fancy	FAN-TASY
	Physiognomy																			Phantasm	
	Inanimate																			Symbolism	
	Atmosphere																			Original	
OB-JECTS	Utility																			Symmetric	AB-STRACT
	Ornaments																			Asymmetric	
Style																				Technical	
Movement																				Careful	
COVERAGE	Full																			Casual	
	Empty																			Light	SHADING
	Exponded																			Dark	
	Constricted																			Orientation	
Organization																				Closure	
Detail																				Parts	
LINES	Curved																			Scribbles	
	Straight																			Duplication	
	Strong																			Repetition	
	Soft																			Schematism	

Anim. Phys.	Ina. Atm. Sof.	Phys . Orna.	Expa. FAN.	OBJECTS	Organized	Anim. Mov.	Emp. Con. Strai.
Expan. Curv.	Symb. As. SHA.	Styl. Organ.	Orig. Asy.	Detail	Technical	Ful. Strong	Stro. Care. Clo.
Casual	Pa. Scr. Sch.	Symmetr.	Dark			Dark, Orie.	Rep. Duplic.
Open	Seclusive	Combinative	Creative	Practical	Speculative	Dynamic	Controlled
EMOTION		IMAGINATION		INTELLECT		ACTIVITY	

KINGET DRAWING-COMPLETION SCORING PROFILE

Name_____ Date_____

1. Is drawing one of your hobbies?_____
2. Have you had any training in drawing or art?_____ If yes, how much and to what extent?_____
3. What things do you usually draw?_____
4. Do you prefer a certain type of drawing or art?_____If yes, what kind?_____

* * * * * * * * *

Did the signs make you think of anything else besides what you drew? If so, of what?

Sign 1_____ Sign 5_____

Sign 2_____ Sign 6_____

Sign 3_____ Sign 7_____

Sign 4_____ Sign 8_____

If you had been a skilled drawer what would you have made out of the signs?

Sign 1_____ Sign 5_____

Sign 2_____ Sign 6_____

Sign 3_____ Sign 7_____

Sign 4_____ Sign 8_____

Which drawings do you like best?_____

Which drawings do you like least?_____

Which signs were easiest to complete?_____

Which signs were the most difficult?_____

Questionnaire to accompany The Drawing-Completion Test.

APPENDIX B

CRITERIA USED IN THE INVESTIGATION

One of the major requirements of the experimental design of this investigation was for a set of objective criteria, adequate for the evaluation of the drawings. The following criteria were developed and used to meet this requirement. They were the product of a study of the criteria presented by Kinget in her book and an attempt to increase their objectivity.

A comparison of these criteria with those given by Kinget will reveal an agreement between the two in the case of three scoring variables. It appeared to be necessary, however, to utilize slightly different criteria for the single Profile Variable, and develop appropriate sets of scoring values, the content of which was not suggested by Kinget. In the case of scoring the variables, it was necessary to elaborate upon the content of each scoring value. The use of half point values was eliminated, since it was difficult to make many of the fine differentiations required in their use. The result of this procedure will be found in the following sections, which describe the content of each scoring variable, the basis of its scoring, the relation of

its scores to the profile variable, and the content of each score value. The presentation in some cases closely parallels that given by Kinget; however, all cases Kinget's presentation has been supplemented and amplified.

PHYSIOGNOMY - NATURE

Physiognomy was considered in terms of human and animal physiognomy. Human physiognomy included any indication of sex through the amount, length, or style of hair or through the character of the features or clothing; approximate age; facial or postural expression; clothing or the role being played; portraits or caricatures; t' absence or emphasis of certain features; or the deliberate limitation of a figure. Animal physiognomy included any characteristic which was proper of, or attributed to, an animal and which was expressed or emphasized in a drawing. Scoring for Physiognomy was in terms of the degree of physiognomic expression, regardless of the data given on the inquiry sheet. When they occurred together in the same drawing, human and animal physiognomy were scored separately with the total never exceeding three points for a single drawing. Scores for Physiognomy contributed to the total score of Combinative Imagination.

HUMAN PHYSIOGNOMY

One Point -- This included animated items with a faint or vague indication of age or sex. The elaboration of the figure was limited to the inclusion of essential features.

Also included animated items with a definite indication of both sex and age. There was either a whole figure with some inner elaboration or a head with considerable inner elaboration.

Two Points -- This included physiognomic elements which directly suggested information about the personality of the depicted human figures. There was a definite indication of age and sex with an emphasis of features or the facial expression.

Three Points -- This included richly and abundantly detailed human figures strongly suggestive of the personality of the figure. The indication of age and sex was combined with other indications, such as those of clothing or activity.

ANIMAL PHYSIOGNOMY

One point was given for whole and complete animals with slight elaboration and a slightly expressed or emphasized characteristic that was proper of, or attributed to, the animal. Two points were given for a definite expression of an emotion or emphasis of a characteristic that was proper of, or attributed to, an animal.

ORNAMENTS - OBJECTS

Ornaments referred to the representation of all concrete objects which served the purpose of personal adornment or interior decoration. It did not include decorative patterns or primary symbolic ornaments, such as religious objects, family crests, and flags. It included ornamental-utilitarian

objects. Scoring was lower for those ornaments that were commonly a part of the object they adorn, such as a bow in the hair, a feather in a hat, or glasses being worn. Scores for ornaments contributed to the total score of Combinative Imagination.

One Point -- This includes occasional ornamental objects, such as wigs, hat pins, watches, rings, feathers, hair ribbons, necklaces, bracelets, and other objects which were frequently produced in response to a particular stimuli.

Two Points -- This included occasional ornamental objects such as flower bowls, vases, piggy banks, hats, fireplaces, and other objects which were less frequently produced.

Three Points -- This included rare ornamental objects such as purely decorative scenes and furniture, curtains, lamps, wall pictures, busts, and sculpture.

STYLE

Style referred to an indication of the nature of the setting of an object beyond the mere representation of the object itself. It did not include an indication of land, water, or sky about the object without reference to a definite location or setting. Scoring was in terms of the intensity of the indication of setting without reference to the inquiry sheet. Scores for style contributed to the total scores of Combinative Imagination.

A score of one point was given for a slight degree of constriction, two points for moderate constriction, and three points for extreme constriction.

EXPANSION - COVERAGE

Expansion referred to several different kinds of drawings: (1) drawings with an implicit tendency to extend beyond the limits of the drawing area, such as landscapes, town views, and interiors; (2) drawings with the presence of only a part of a well-defined object; (3) drawings with a wide spreading or scattering of the elements over the drawing area; and (4) drawings that were relatively large and lacked any inner structuring. Scoring was in terms of the type of drawing, the completeness of the objects drawn, and the relative size of the "universe" represented. Scores for Expansion contributed to the total scores of Creative Imagination.

One Point -- This included several different kinds of drawings: (1) drawings which showed a wide spreading or scattering of the elements over the drawing area; (2) drawings of complete objects and a small part (e.g. sun or moon) of an infinite universe; and (3) drawings of a "universe" that was highly limited and restricted to immediate physical objects and surroundings. The latter was the most common and included such things as the room of a house, a part of a shadow, a sheet of paper, a pencil, a table, a truck, a factory, a building, a leaf or plant, or a lighted flashlight.

Two Points -- This included several different kinds of drawings: (1) drawings which contained a combination of any of the one-point items; (2) drawings of a part of a large object and a small part (e.g., sun or moon) of an infinite "universe"; (3) drawings which lacked inner structuring and covered about half of the area or more; or (4) drawings with the "universe" limited to immediate geographical surroundings, such as a particular neighborhood, a certain area of water, a section of land, or a country.

Three Points -- This included a drawing either with a small part of the definite "universe" and no objects immediately present or with a "universe" that was not restricted to an immediate location but was in terms of the world or the whole universe. The latter occurred more often and included scenes with space ships, a particular planet, the sun with sunrays, the moon, or a star.

ORGANIZATION

Organization referred both to the various ways and degrees in which the actual structure of the object was depicted in representational content and to the logical planning involved in the arrangement of elements, lines, and surfaces in abstract content. It pertained to the adequate arrangement of the elements and not to their formal perfection; there had to be some sort of apparent possible meaningful relationship among the elements. Scoring considered two levels of Organization: the lower level included two-

dimensional drawings and the higher level included three-dimensional drawings. Scoring was in terms of the degree of "meaningfulness" and the adequacy of the structural arrangement. Scores for Organization contributed to the total scores of Combinative Imagination.

The following definitions applied to the degree of depth used to describe various three-dimensional drawings: "shallow" referred to those drawings in which the reality distance between the foremost and the most distant aspect was slight; "moderate" referred to distances within the immediate foreground; "considerable" referred to drawings which included distances beyond the immediate foreground; and "extreme" referred to distances suggesting extension beyond the depicted distance (e.g., the horizon with clouds, the sun, or stars).

The following definitions applied to the degree of emphasis in describing depth: "slight" referred to a minor indication of a particular depth; "moderate" referred to a definite and recognizable indication of a particular depth; "strong" referred to a readily apparent indication of a particular depth; and "very strong" referred to an extremely apparent and pronounced indication of a particular depth.

TWO-DIMENSIONAL DRAWINGS

<u>One Point</u> -- This included drawings that had a crude and impoverished content and arrangement of elements or a poor and doubtful relationship among the elements. Also

included, drawings which had a good, simple, and adequate structure and arrangement of the elements, among which there was a definite relationship.

Two Points -- This included drawings which had good, superior, and dynamic structure and arrangement of the elements; either such an arrangement gave a rather life-like or realistic character to a drawing or the drawing involved activity of some kind.

THREE-DIMENSIONAL DRAWINGS

One Point -- This included drawings with a very simple and almost inadequate structure; there was extreme simplicity with a minor amount of structure and arrangement of elements. There was a slight or moderate suggestion of depth.

Two Points -- This included drawings with a definite degree of elaboration and with an adequate, complete, and somewhat complex structure or arrangement of elements. There was either a slight suggestion of extreme depth; a moderate suggestion of considerable depth; a strong suggestion of shallow depth; or a very strong suggestion of slight, moderate, or considerable depth.

Three Points -- This included drawings that were definitely superior and dynamic and with an excellent arrangement of the elements. The depth was extremely well presented with strong realistic or life-like qualities.

FANCY - FANTASY

Fancy included such things as fancy-colored reality, fairy-tale matter, known mythological figures, personal creations of the drawer, and free-fancy pictures. It did not include drawings with a negative emotional tone that was depressing, frightening, or weird; such drawings were scored for Phantasm. Scoring was in terms of the kind of Fancy and involved reference to the inquiry sheet. Scores for Fancy were combined with those given for Phantasm and Symbolism and contributed to the score of Creative Imagination.

One Point -- This included drawings of fancy-colored reality; although the content matter belonged to reality, it was not taken from the subject's direct personal experiences. It included slightly and deliberately distorted human and animal profiles, emphasizing a certain characteristic. This distortion was not due to the completion of the stimulus, itself, but was a function of the whole drawing with the stimulus having a purely secondary role in the distortion. Also included, drawings of fairy-tale matter, such as the characters of popular legends, figures and scenes from known fairy-tales, and specific known cartoon figures. Since such themes were directly inspired by cultural factors, their reality value largely predominates over the Fantasy content.

Two Points -- This included drawings of known mythological figures in which there was a blend of Fancy and reality wherein either might predominate. Also included,

drawings of personal creations of the subject, such as personifications of natural or supernatural forces, personified sun or moon, robots, and mechanical men. Reality elements became secondary.

Three Points -- This included free-fancy pictures, which lacked the cultural basis underlying most of the above mentioned varieties of Fancy. Only the material elements were taken from reality; their presentation and combination were largely independent of direct perception or cultural influences. This group could be so independent of reality as to almost merge into non-representational kind of drawing. It specifically included non-specific cartoon figures and space ships.

PHANTASM - FANTASY

Phantasm was characterized by an extreme remoteness from visible reality with a negative emotional tone that could have been depressing, frightening, or weird. There was a distorting or ignoring of reality that lacked the cultural influences reflected by most of the other forms of reality. Typical themes included grotesque and fabulous creatures, such as monsters, dragons, devils, ghosts, fawns, scenes of catastrophy, and tragedy; human or animal figures which were incongruous, queer, weird, gruesome; and semi-representational drawings featuring criss-cross structures with eyes, mouth, or faces. Scoring was in terms of the degree of misrepresentation,

distortion, and negative emotional tone. Scores for Phantasm were combined with those for Fancy and Symbolism and contributed to the total score of Creative Imagination.

One point was given for a slight misrepresentation or distortion. One point was given for a moderate misrepresentation or distortion, and specifically included distorted human features and partly representated faces. Two points were given for considerable or extreme misrepresentation and distortion.

SYMBOLISM - FANTASY

Symbolism referred to the representation of values, ideas, and ideals and not to intellectual or mathematical symbols. It included flags, emblems, crosses, symbolic arrangements of candles, and symbolic representations of religious concepts. Scoring was in terms of the amount of Symbolism. Scores for Symbolism combined with scores for Fancy and Phantasm, the scores contributed to the total score of Creative Imagination.

One point was given for a slight but direct and almost blunt suggestion of symbolism without elaboration. Two points were given for a rather refined and subtle suggestion of symbolism with perhaps a small area of the drawing used. Three points were given for scenes that were primarily and overwhelming symbolic in nature with the whole drawing area used.

ORIGINALITY

Originality referred to content material ranging from a practically unique theme to a more or less unusual one which occurred not more than ten per cent of the time. Three conditions, however, had to be met in scoring for Originality: (1) a rare theme must have been presented; (2) the theme must have been representational or have a specific meaning. These implied a definite adequacy of execution and presentation that was beyond the representation of only essential detail. Scoring was in terms of the "uniqueness" of the theme. Scores for Originality contributed to the total score of Creative Imagination.

One point was given for an unusual theme and treatment which could be expected to occur in not more than ten per cent of the drawings. Two points were given for a rather unusual theme which was treated in an unique manner; similar treatment would have been encountered occasionally. Three points were given for a very unique theme which was not apt to occur again in response to a particular stimulus.

SYMMETRIC - ABSTRACTION

Symmetric Abstraction referred to the presence of regular, static, and often rigid geometric patterns; it included objects that were a decorative design in themselves, but not designs that were part of the object. Scoring was in terms of the complexity of the drawing. Scores for Symmetric-Abstractions contributed to the total score of Combinative Imagination.

One point was given for very simple representation, uncomplicated, and unelaborate symmetrical material. One point was given for a simple abstraction with very little real elaboration. Two points were given for a complex abstraction with at least moderate elaboration.

ASYMMETRIC - ABSTRACTION

Asymmetric Abstraction referred to designs showing a free play of lines, shading, and masses and arranged in a free and playful original way. The execution could have been harmonious and well integrated, or could have lacked inner balance and spontaneous gracefulness; such drawings might have been original, eccentric, or incoherent. Designs that were a part of an object were not included. Scoring was in terms of the degree of harmony and integration. Scores for asymmetric abstraction contributed to the total scores of Creative Imagination.

One point was given for drawings that were rather rigid, incoherently organized, and primarily used straight lines. One point was given for drawings that were slightly rigid, had good arrangement of the elements, and only used lines. Two points were given for harmonious and well-integrated drawings with a good use of both lines and shading and an abundant use of curved lines.

TECHNICAL - ABSTRACTION

Technical-Abstraction referred to all kinds of intellectual symbols, geometrical figures, technical devices, and almost all other subject matter characterized by intellectual meaning or logical symoblism. It did not include such objects as blocks, targets, and emotionally toned monograms, names, or words. Scoring was in terms of the type of Technical-Abstraction without regard to the adequacy of the execution. If a drawing was scored for more than one kind of Technical-Abstraction, the total score of a particular drawing could not exceed three points. Scores for Technical-Abstractions contributed to the total score of Creative Imagination.

One point was given for drawings consisting of schematic designs produced by merely repeating, continuing, or connecting the stimuli. One point was given for drawings of elementary geometrical figures, numerals, and letters. Two points were given for signs, names, and words. Two points were given for sterometric figures. Three points were given for scientific and musical symbols. Three points were given for drawing of plans, blue prints, maps, charts, graphs, and other drawings.

LIGHT AND DARK SHADING

Both Light and Dark Shading could include smooth and homogeneous even surfaces, scrawls, and criss-crossings, or some mixed and indefinite kind of Shading. Light Shading referred to the qualities of lightness, transparency, and subtleness; and included faintly sketched or almost invisible

indications of skies, sunrays, or distant and vague vista effects. Dark Shading referred to the qualities of darkness, heaviness, and blackness; it did not include lines that had been reinforced to darken or broaden them. The difference between Dark and Light Shading was, to a great extent, detected in terms of the individual set of drawings rather than in terms of an absolute scale. Scoring was in terms of the ratio of the area covered by an intensity to the total area covered by the drawing. Scores for Light and Dark Shading were combined and contributed to the total score of Creative Imagination.

In scoring for Dark Shading, one point was given to a value for a very dark intensity or for a completely solid shading. In scoring for Light Shading, one point was given to a value for a light and "airy" intensity or for a completely solid shading. A single drawing could not receive more than three points for either intensity.

One point was given for a slight trace of an intensity utilizing a very minor area of the drawing. One point was given for a moderate amount of intensity utilizing one-fourth or one-third of the drawing. Two points were given for a considerable amount of an intensity utilizing one-half or two-thirds of the drawing. Three points were given for an excessive or predominant amount of an intensity.