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THE DEVELOPMENTAL PROCESS, THE INHIBITION PROCESS, AND THE PRODUCTION OF HUMAN MOVEMENT ON THE KINGET DRAWING COMPLETION TEST

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BY

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THE DEVELOPMENTAL PROCESS, THE INHIBITION PROCESS, AND THE PRODUCTION OF HUMAN MOVEMENT ON THE KINGET DRAWING COMPLETION TEST

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THE DEVELOPMENTAL PROCESS, THE INHIBITION PROCESS, AND THE PRODUCTION OF HUMAN MOVEMENT ON THE KINGET DRAWING COMPLETION TEST

CHAPTER I

INTRODUCTION

The first problem that presents itself in any study of intelligence is that no scholar pretends to know what intelligence is; furthermore there are no known units by which intelligence can be measured. Scholars agree widely on only one point: that whatever intelligence is, it is developmental; that is, other things being equal, a child of 8 years of age shows evidence of having greater intellect than he had at 5 years, and at 15 he evidences a higher intellective level than he did at 8. Up to the present time, the most reliable measures of intellective development indicate that intellective growth, much like physical growth, tends to cease in middle to late teens. This conclusion carries no implication that <u>learning</u> tends to cease at this point.

Intelligence has many facets. One contrast that is fairly readily recognized is that between "facile" intelligence and "abstract" or "reasoning" intelligence. A student with a well-developed facile intelligence will probably tend to make good grades throughout high school because of his ability to understand and follow directions and to retain and hand back information. If this student does not possess the additional quality of abstract intelligence, he will tend not to achieve the same degree of success in college, where he is called upon to show evidence that he can reason from the information he learns. On the contrary, many students who have achieved only moderate success with grades, even through undergraduate years in college, may have such a well-developed abstract intellect that they are highly successful in making good grades in graduate school.

Another problem, much less readily recognized, is that of the "repressed" intellective level. Some emotionally disturbed persons are erroneously classified as mentally retarded because their emotional imbalance inhibits their intellective functioning.

Since the exact nature of intelligence is unknown, and since there are no known units by which to measure intelligence, any test which purports to measure it can be nothing more than a controlled observation of behavior; the subject's intellective level is inferred from observation of what he does--his performance--and from a comparison of that performance with the performance of other persons of similar age and background. Scholars infer that if most children at age 4 cannot tie their shoelaces and if most children at age 5 can tie them, then a normal 5-year-old can tie shoelaces--provided (and this is a very important provision) he has been accustomed to wearing shoes with laces.

Reliable intelligence tests take into account the different cultural backgrounds of the subjects for whom the test is designed. The Stanford-Binet Intelligence Scale contains questions for young children on such widely differing topics as snow, coal, oranges, kites, buying candy in a store, and feeding puppies in a barn.

A commonly accepted distinction between intelligence tests and achievement tests is that intelligence tests purport to measure innate intellective capacity, whereas achievement tests--both teacher-made and standardized--attempt only to measure a student's recollection of information which has been taught at a certain grade level or in a particular situation. Many tests of mechanical, clerical, and other specific aptitudes, as well as tests of predominant interests, personality patterns, and emotional and mental balance, have been widely used. Attempts are frequently made to find clear distinctions in these tests between verbal and other aptitudes. However, up to the present time, no one has devised a test which can be categorized as completely non-verbal. Experience with the tests has shown that students will frequently verbalize, aloud or silently, the procedure or steps of their performance.

Another approach to testing which is receiving increasing interest and study is known as the projective technique of testing. The projective tests attempt to explore more fully the subject's subconscious, as well as his conscious, reactions to stimuli. Probably the best-known of the tests which make use of the projective techniques is the Rorschach inkblot test, in which the subject looks at a series of cards picturing meaningless inkblots, the two halves of which are identical, some printed only in black or shades of gray and some printed in various colors. As each card is presented to the subject, he tells the examiner what he sees in the inkblot. This test is used primarily by clinicians to assist them in evaluating the degree and nature of emotional and mental illness. However, one particular facet of this test has aroused the interest of educators: Rorschach (1942), Beck (1961), Piotrowski (1957), and others assert that the percentage of the production of Humans (H) and Humans in Movement (M) on the Rorschach test is a measure of the intellective level of the subject.

Another projective test widely used by clinicians is the Thematic Apperception Technique (TAT), which consists of thirty pictures, variously designed to be appropriate to the age and sex of the subject. The subject is presented a series of these pictures, selected according to the subject's sex and age. The pictures are presented one at a time, and the subject is asked to tell a story as each picture is presented. Although the TAT, like the Rorschach, is used primarily by clinicians in diagnosing the degree and nature of mental and emotional illnesses, Henry (1956, p. 110) states:

> An examiner with some clinical experience in intelligence testing and experience with TAT records on subjects of known IQ level can usually estimate the IQ to within five points.

Unlike the single factors of Humans and Humans in Movement on the Rorschach for estimating intelligence level, the estimate of IQ on the TAT is based on a complex, rather subjective analysis of at least eleven different elements in the variety of responses.

Numerous projective tests have been devised which attempt to provide stimuli that will induce the subject to reveal, consciously and subconsciously, some clues to his inner self or his self-concept. These projective tests present stimuli which, in general, fall into six categories:

1. Stimuli which are almost totally unstructured, such as modeling clay, or a blank sheet of paper and a pencil or paint. Instructions are usually brief, such as "Make anything you wish," or "Draw a person (boy, girl, house, tree)." Well-known examples are the Machover Draw A Person Test, the Goodenough Draw a Man Test, the House-Tree-Person Test, and finger painting.
2. Stimuli which in themselves are so abstract and

ambiguous as to be essentially meaningless except as the subject injects meaning into them. Among these are the Rorschach inkblot test, other inkblot or "cloud formation" tests, the Bender-Gestalt test in which the subject is asked to copy meaningless stimuli, and the Kinget Drawing Completion Test which is being investigated here.

3. Stimuli which are partially complete pictures. Instructions are usually limited to asking the subject to complete the picture. Among these are the "Picture Completion: Man" portion of the Stanford-Binet Intelligence Scale. (Criteria for judging the completion of pictures are also applied to the original drawing tests mentioned in No. 1 above.)

4. Picture stimuli which, although they contain complete or incomplete pictures of people, objects, or other meaningful material, are more or less neutral as presented. The subject responds to these stimuli by telling stories, drawing inferences, or reaching conclusions about the stimuli. Although many such tests have been devised, probably the best known and most widely used are the Children's Apperception Test, the Symonds Picture-Story Test, the

Thematic Apperception Test, the Blacky Test, and the pictures in the Stanford-Binet Intelligence Scale.

5. Verbal stimuli, such as single words, either widely different or closely similar in meaning; incomplete, scrambled, or whole sentences; incomplete, scrambled, or whole paragraphs or stories; and sentences, paragraphs, or stories in which an occasional word is replaced by a blank line. (Although clinicians often find clues to the subject's subconscious preoccupations by observing the pattern of responses, many of these tests would not be classified as projective approaches.) The subject may be asked to respond by saying as many words as he can in a limited time; by telling what the words mean to him; by ranking in order of importance; by sorting, associating, or describing those which are alike and those which are different; by repeating words, phrases, or sentences, either meaningful or nonsensical; by unscrambling a sentence, paragraph, or story; or by completing a sentence, paragraph, or story. This completion, whether filling in blank spaces or telling beginnings, middles, or endings, may be of his own creation (free association) or it may be a

more structured (multiple) choice which he makes from a supplied list.

A multitide of such verbal tests have been devised and are widely used. Among the best-known are those pioneered by Jung (word lists), portions of the Stanford-Binet Intelligence Scale, the Page-Epstein Fantasy Scale, French's Test of Insight, and the Rotter Incomplete Sentences--College Form.

Although verbal tests usually can be administered, scored and analyzed relatively quickly and easily, there are two disadvantages in their use as projective techniques. Their purpose is less disguised than in other projective tests, and the sophisticated subject may tell the examiner only what he wants him to know. Furthermore, verbal tests administered on a group basis generally require reading and writing skills to a greater extent than do other group projective tests (Anderson, 1951, pp. 295-296).

6. Interpersonal stimuli, such as are provided in play therapy, puppetry, sociodrama, psychodrama, and group therapy. These approaches may range from free situations, in which the examiner observes the spontaneous behavior of the subject in action, to highly structured situations, in

which the examiner sets up specific conditions to elicit the subject's responses to planned stimuli. An example of the latter type is the Projective and Expressive Action Test developed by Corneytz and Del Torto. This test has specific instructions which the examiner gives the subject. It also enables the examiner to gather data about the subject systematically (Anderson, pp. 662-674).

Out of these projective techniques, the Kinget Drawing Completion Test was selected for this experimental study. It should be made clear at this point that although the present dissertation is concerned with an experimental study of the developmental process in intellective level as exhibited by the production of human movement on the Kinget Drawing Completion Test, the experimenter has made no assumption that visualizing Humans in Movement (*M*) on the Rorschach inkblot test is necessarily a correlate of drawing human movement on the Kinget.

The Kinget Drawing Completion Test

The Kinget presents the subject with eight white rectangles within intensely black borders. Each rectangle contains a black stimulus, four of them curved or circular and four of them straight or square. The subject is directed to begin with any one of the stimuli and make any drawing he wishes, using that stimulus. He numbers the drawings in the sequence in which he draws them; then, using these numbers, he writes down what he has drawn. (See sample in Appendix.)

These eight drawings allow the experimenter a broad base for interpretation; that is, the subject has more opportunity to present different aspects of his responses than he has when fewer stimuli are given, as in most other drawing completion tests.

According to Kinget (p.3) this Test resulted from work begun by F. Sander of the University of Leipzig, who devised a Phantasie Test in which the subjects were confronted with material of the kind used in the Drawing Completion Test. Ehrig Wartegg, another representative of the School of Leipzig, continued along the same line of investigation and originated the Drawing Completion Test as it appears here. G. Marian Kinget became interested in this projective test and administered it to over 500 subjects. Using rating scales, she compared the drawings to information gained from interviews and questionnaires, and reported her conclusions (Kinget, 1952). She cites no statistical data for her interpretations, and in discussing the obstacles she encountered in validating the test, she makes the following observation:

> . . . advancement in projective testing seems to be served better when a given approach is further verified, clarified, and improved in the direction of practicability.

Kinget clearly implies in many of her discussions of the drawings that the level of intellective functioning is involved in the Drawing Completion Test. Unfortunately, however, she does not present validating data to support her conclusions.

She discusses (p. 9) Wartegg's "four-dimensional schema composed of the traditionally recognized basic functions: emotion, imagination, intellect and will." (She goes on to explain that the word "activity" might better be substituted for the word "will.") She states that Wartegg "then split each of these functions into two more or less opposed characteristic aspects." The polar aspects of the intellect he called practical and speculative. Some understanding of Kinget's approaches to intellective functioning as revealed in the Drawing Completion Test may be gained from her diagnosis of the characteristic polar aspects of intellect (p. 10):

> The individual with practical intellect operates principally by perception and observation and is characterized by clear consciousness, orderly thinking, and directness of expression which lend his personality a strictly matter-of-fact and positivistic quality. Whereas this type of intellectual make-up is oriented towards facts, concrete reality and inductive reasoning, the speculative type prefers principles to facts, reasoning to observation, and theory to practice. When this type is of above average intelligence he easily becomes highly sophisticated, likes to make fine distinctions and to devise vast theoretical systems. When he is of medium intelligence he presents a vaguely rationalistic, impractical and somewhat reality-estranged intellectual make-up.

Kinget points out further (p. 11) that both the "hair-splitting rationalist" and the "constructively perspicacious mind" fall under the pole of the speculative type of intellect. Further, she states that the characteristics grouped under each pole are not mutually exclusive--that they "overlap to a noticeable extent." Kinget concludes (pp. 11-12):

> The clinical value of the schema is, therefore, essentially dependent upon the degree of differentiation achieved by the test; in other words, upon the number of correlations discovered between specific characteristics of personality and specific characteristics of the test results.

Throughout her book, Kinget attempts to limit her analysis of the drawings to their significance as evidence of personality characteristics. However, since intellective functioning is a part of the total personality structure, inevitably she refers to certain aspects of the drawings in relation to the subject's intellect. For example, in her discussion of technical drawings (drawings of "all kinds of intellectual symbols, geometrical figures or technical devices") she states that they "do not afford a reliable basis for appreciating the <u>level</u> of intelligence" (pp. 45-48).

Although this dissertation is concerned only with the production of human movement and is not concerned with physiognomic details of these drawings, it is interesting to note that Kinget implies (p. 57) that accentuation of eyes and ears (rather than nose and mouth) in a drawing of a face is more likely to appear in "drawings of the more intellectualized or sublimated individuals." Another of Kinget's assertions in this connection is worth noting:

> When subjects who show a tendency to negate their vital urges to intellectual or spiritual aspirations represent human figures--which they seldom do--they often draw heads without any indication of the rest of the body. . . . , or at least without anything more than a faint neckline. . . . However, no absolute rules are applicable; . . . .

Of particular concern in this dissertation is the following statement by Kinget in her discussion of the drawings of Objects of Utility (p. 67):

> Complete lack of Utility, as well as complete lack of Animate Nature, is always unfavorable for it suggests a defective integration of practical intellect or of emotion within the total structure of the personality. . . . . Absence of Utility is more serious . . . in the products of manual workers than in those of intellectuals or artists, and vice versa.

In her discussion of Symbolic drawings, Kinget implies that there is a positive relationship between a subject's intellect and his drawings (p. 76):

> Symbolism expressed through objects, animate, inanimate, or simply material . . . suggests a satisfactory integration of speculative and practical intellect; . . . .

Kinget makes many other assertions, not pertinent to this dissertation, about the effect of intellect on the drawings, such as the relationship between Intensity (of pencil pressure) and Form Level. However, she broadly qualifies these assertions. In the following statement Kinget indicates further relationship between the Drawing Completion Test and intellective level (pp. 83-84):

> The study of Intensity is particularly interesting when objective data such as biometric indexes and I.Q. or comparable aptitude records are available. Such data provide important information regarding basic components of the personality but they fail to inform

> about the actual functioning of these components in terms of drive, efficiency, and consistency of the activity. In other words, such data do not reveal whether the vital and intellectual energies operate more or less independently or whether they blend smoothly and productively. A person's intelligence may work with the consistency that characterizes his vitality, or it may work independently of that vitality in a sporadic unreliable way; his vitality may tend to exhaust itself in either external activity or cerebrality or it may be distributed more or less evenly over both muscular and intellectual mechanisms.

Kinget also discusses intellect in its relation to drawing of Detail, of which she says (p. 101):

> The Drawing-Completion Test shows no direct relation between number of details and degree of intelligence. Indications concerning the level of intelligence can be derived only when both function and amount of Detail are considered in combination with Organization.

Although, as stated earlier, Kinget usually avoids discussion of level of intellect in relation to the drawings, she frequently expresses directly, or implies, that degree and level of Organization of the drawings are an indication of the subject's intellective level. Her explanation of Organization involves many aspects and requires highly subjective conclusions by the person judging the drawings. However, perhaps this definition will serve to sum up what Kinget scores as Organization (p. 102):

> When applied to representational content, Organization refers to the various ways and degrees to which the actual structure of the object is depicted. With Abstract drawings it refers to the logical planning involved in the arrangement of the elements, lines and surfaces making up such drawings. Minor forms of surface elaboration, occurring in representational as well as in abstract drawings, must also be scored for Organization.

Kinget sets forth her conviction of the relationship between intellective level and Organization thus (p. 103):

> Degree and level of Organization are significant in regard to the logical, analytical and synthesizing capacities of the subject, his ability to deal with principles, to understand and visualize complex relationships. This is especially true for drawings showing linear three-dimensional organization.

She immediately qualifies this conclusion, however, by adding:

> Absence of such forms of organization does not, however, justify reversal of the above conclusion, especially not when the drawings are made with great speed.

She further complicates scoring for Organization by her next statement:

> Organization in two dimensions, such as found in maps and blueprints, is also an indicator of intellectual ability though a less reliable indicator than Organization in three dimensions. Flat forms of Organization, such as mere elaboration, are hardly representative of intellectual capacity.

Kinget then makes these positive assertions (p. 104):

> Predominance of Organization over Detail at any level of complexity: always a favorable indication of intelligence.
>
> Predominance of Detail over Organization: unfavorable indication in regard to intellectual capacity and emotional maturity.

However, the numerous qualifications which she sets forth would make scoring extremely subjective. Moreover, her final assertion on this criterion makes it impossible to assume that Organization is essential in estimating intellect:

> Poor Organization and scant Detail: not conclusive, dependent on length of drawing time; frequently an

> indication of low average intelligence; may occur in speedy performances of highly intelligent adults.

Perhaps Kinget's discussion of Repetition, Duplication, and Recurrence best reveals her indecisiveness in drawing clear-cut inferences as to the relationship between specific elements of the drawings and intellect. She discusses these "various forms of uniformity" and states (p. 105):

> In regard to intellectual functioning they reveal a scarcity of associations, defective mental mobility and suppleness, a lack of originality and a marked tendency towards perseverance.

On the other hand, however, she states (p. 105):

> Repetition and Recurrence may be due to a temporary state of emotional or general disturbance such as anxiety or depression, in which the subject is unable to think of adequate and varied ways of completing the stimuli. In such cases, the above mentioned deficiency of the intellectual and volitional functions are, of course, not to be regarded as basic characteristics of the subject's personality.

Although it is clear that the Kinget Drawing Completion Test is potentially an inestimably valuable tool as a relatively non-verbal diagnostic test of intellective level or of intellective functioning, its use cannot be justified until it has been subjected to rigidly controlled experimental studies to establish its reliability and validity. Kinget's conclusions about the meaning of the drawings seem logical in the light of what many psychologists believe about such projective techniques. However, her criteria for judging the drawings are so complex and ambiguous as to make analysis of the drawings highly subjective and therefore impractical. Furthermore, the proliferation of ambiguity in her conclusions (however sound her own analyses may be) make obvious the fact that, without further validation, analyses of the drawings are likely to reflect the orientation of the person who is judging them rather than to reflect the nature of the subject who has completed them.

If, under controlled experimentation, some or all of the assumptions made by Kinget and others about the drawings prove to be valid and reliable, this Test could be an extremely valuable diagnostic device to assist psychologists, teachers, and counselors to evaluate scholastic difficulties not determinable by other, more verbal, standardized tests. Since a student's scholastic success depends upon how he _functions_ in the school situation, Kinget's assumption that the test provides insights into the _functioning_ of the individual is of particular interest to the educator.

The Rorschach Inkblot Test

The Rorschach inkblot test was devised by Hermann Rorschach and was described by him in a monograph published in 1921. This test has received increasing attention through the years since that time. Rorschach (1942), Beck (1961), Piotrowski (1957), and others assert that the percentage of production of Humans in Movement (_M_) on the Rorschach is a measure of the intellective level of the subject.

Although, as stated earlier, the present study makes no assumption that *perceiving M* on the Rorschach is a correlate of *drawing* human movement on the Kinget, it is logical to assume that there may be some relationship between *perceiving M* in the meaningless inkblots on the Rorschach and *drawing* human movement from the neutral stimuli on the Kinget Drawing Completion Test. The assumption that these two projective techniques are somehow related is borne out by the fact that Kinget's analyses of many factors in the drawings parallel analyses made by Rorschach, Beck, and Piotrowski of the Rorschach test. For example, Beck concludes (Anderson, 1951, p. 107) that the subject who emphasizes major detail in the blot stimulus is a person of practical intelligence. In referring to *Organization* by the subject in response to the blot stimulus, Beck states (Anderson, 1951, p. 107):

> This measures the ability to grasp new, meaningful relations between portions of the figures not usually so organized. Other writers have studied the *organization* variable. It appears consistently related to intelligence in the *height* dimension. More recent observations lead to the conclusion that its principal value is that of indicating the degree of *liberated* intellectual energy.

The parallel is evident between the above analysis by Beck and Kinget's statement (Kinget, 1952, p. 101):

> Indications concerning the level of intelligence can be derived only when both function and amount of Detail are considered in combination with Organization.

Although many other parallels are stated or implied in analyses of the Rorschach and in Kinget's analyses, pertinent to this study are statements by Rorschach, Beck, Piotrowski, and others about the relationship between intellective level and perceiving of *M* in the Rorschach ink-blot test. Piotrowski (1957, pp. 142-143) states:

> The more prominent the *M* in a subject's record, in terms of absolute and relative numbers, the stronger is his urge to live his life uninfluenced by others, and the more likely to act upon his own ideas rather than upon suggestions from outside sources. By his effort to be independent of influence, the individual with many *M* gains time and opportunity to organize and develop his own thoughts and, thus, other conditions being equal, is more original and creative than others. On the other hand, a creative intelligence is necessary to be relatively independent of others in one's outlook on life and yet be well adjusted and capable of constructive cooperation with others. A good social adjustment requires a greater intellectual effort of a strong *M* person than of persons with less pronounced *M*. Rorschach stressed the idea that the *M* are positively correlated with creative imagination and with the level of intelligence although the correlations need not be high. The new concept of the meaning of the *M* leads to the same conclusion.

Piotrowski states further (p. 149):

> Rorschach discussed at length the ratio of the sum of the *M* to the sum of the *CR*, the *CR* standing for "color responses." . . . . The *M* type is characterized in comparison with the *CR* type by a more discriminating intelligence a more spontaneous and more original productivity; . . . .

Of particular significance to the educator is this further elaboration by Piotrowski (p. 150):

> The stronger the *M* type, the greater the division of interests and activities into important and unimportant. This habit of assigning priorities according to one's own scheme of values may lead to the neglect of activities and duties which loom large in the minds of educators, employers, associates, and most other people. The same habit makes the *M* type unusually dependable, thorough, and conscientious in matters of

> which he thinks highly; in matters of this kind he is likely to go beyond the call of duty.

If the above statement is valid in regard to *perception* of *M* on the Rorschach, and if it should be found that *production* of human movement on the Kinget is a developmental process (as *M* on the Rorschach is asserted to be), the present study would be of particular significance to the educator. Whereas the administration and scoring of the Rorschach, even if scored only for *M*, must be individualized, and is so time-consuming as to make its use impractical in the school situation, the Kinget can be group administered, its administration requires the barest minimum of training, and scoring for human movement is relatively quick and easy.

Beck (1961) reports findings from a study he made to the Rorschach Test. His study was made to establish norms, not only for the total number of responses (*R*) to the Rorschach cards, but also for the components which are scored, such as Whole (*W*) responses, Detail (*D*) responses, etc.

Beck's Table 14 (Appendix 3: Norms) lists means of these responses for various age groups. To compile the figures for this table, Beck counted the number of responses of adults "from a population sample (157) representative of the middle range of urban (Chicago) Americans." (Beck, 1961, p. 230).

Regarding the validity of the figures in this table, Beck states:

> The statistics are not valid for persons of much higher intelligence endowment, say in the upper five per cent of our population. The children (155) similarly were out of middle to lower middle-class sectors, with those in the 14-17 year group including some from high schools in the above average population range.

Beck states further that there are "significant differences among the healthy, neurotic, and schizophrenic samples" (Beck, 1961, p. 230).

In the table of means which follows, the examiner has selected from Beck's Table only the means for R (total number of responses) and M (total number of Movement responses):

APPENDIX 3
Norms

Table 14

		Children			
	Adults Means	All Means	Ages 6-9 Means	Ages 10-13 Means	Ages 14-17 Means
R	32.65	27.15	21.93	27.40	41.35
M	3.50	1.28	0.87	1.02	3.04

Converting the Means in this table into percentages, we find that the two younger groups of subjects, ranging in age from 6 to 13, not only gave fewer responses to the Rorschach than did older subjects, but also that of their total responses, the percentage of M produced was lower than the percentage of M produced by the older subjects:

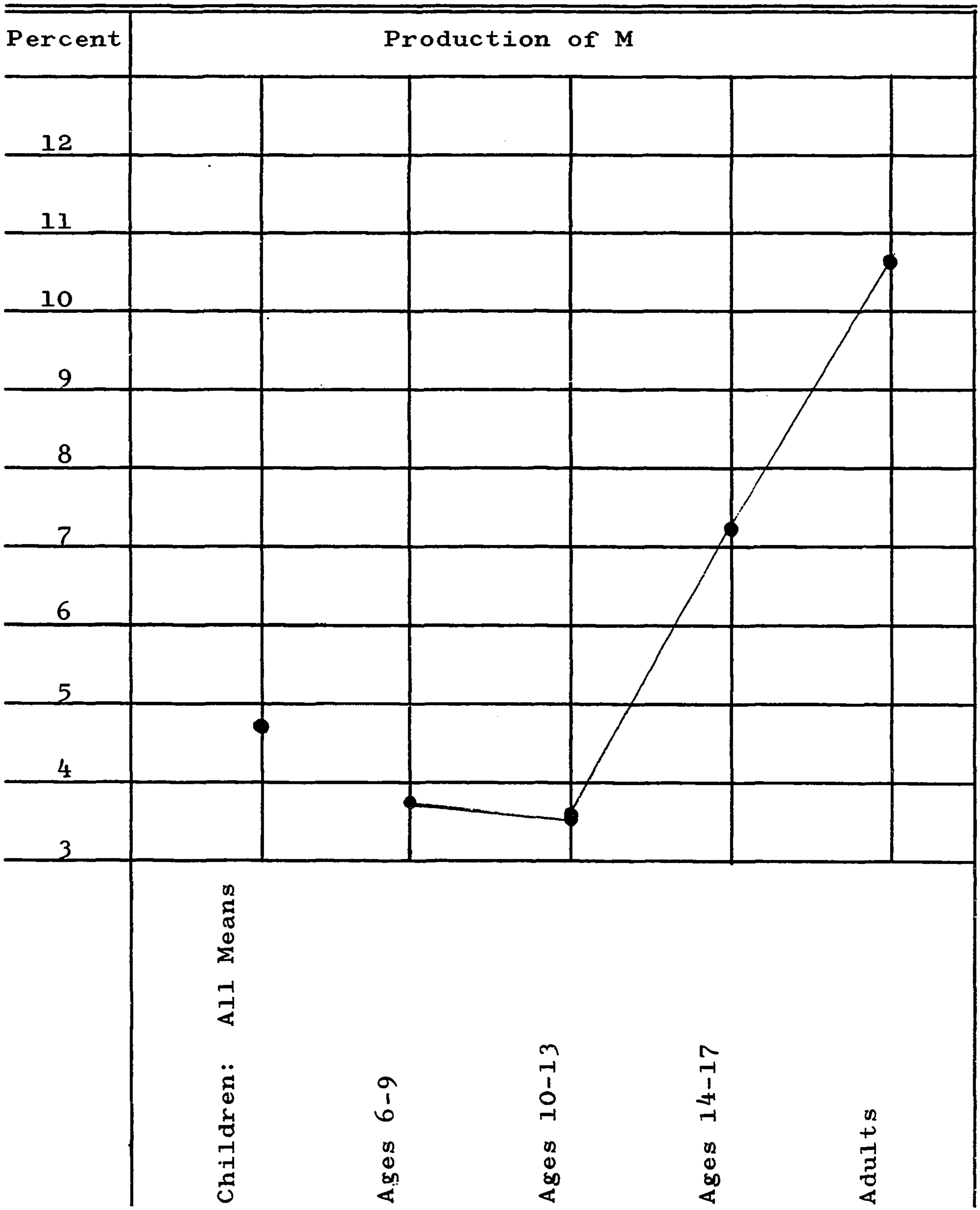
Production of M Responses on Rorschach Test
As Represented by Percentages
of Means of Total Responses

	No. of R	No. of M	Percentage of M
Adults Means	32.65	3.50	10.72%
Children			
All Means	27.15	1.28	4.71%
Ages 14-17	41.35	3.04	7.35%
Ages 10-13	27.40	1.02	3.73%
Ages 6-9	21.93	0.87	3.96%

The percentages in the above table are represented graphically on the following page.

Beck gives no indication of the age of the adults used in the sampling. It will be noted that the mid-point of the ages of each of the three groups of children whom Beck tested is 7 1/2 years, 11 1/2 years, and 15 1/2 years.

Production of M Responses on Rorschach Test
as Represented by Percentages
of Means of Total Responses



Digit Symbol Test of the Wechsler-Bellevue Intelligence Scale for Adolescents and Adults

Studies of the Digit Symbol subtest of the Wechsler-Bellevue Intelligence Scale, Form I (see sample in Appendix), indicate that subjects who fail to make appropriate responses to the reversed N under No. 2 of that subtest tend to be poor inhibitors; that is, they are unable to inhibit the impulse to write the symbol as a properly formed capital letter N (the inappropriate response). Franklin (1963) found that reversers (subjects who respond inappropriately to the reversed N on the Digit Symbol test) produced fewer humans and fewer humans in movement than did non-reversers. She found further than when she combined the scores for humans and for humans in movement, reversers produced them later in sequence than did non-reversers.

When both reversers and non-reversers were administered the Kinget following immobilization, she found no significant difference between their production of human figures. However, she did find that reversers produced significantly fewer humans in movement than did non-reversers. She found further that when she combined the scores for humans and for humans in movement, reversers produced fewer than did non-reversers.

In brief, whether subjected to prior immobilization or not, reversers produced fewer responses dealing with human content than did non-reversers. However, when both reversers and non-reversers had been subjected to prior immobilization, reversers did <u>not</u> significantly produce human content <u>later in sequence</u> than did non-reversers.

In making a comparison of production of humans and humans in movement between subjects completing the Kinget in normal fashion and subjects completing it after five minutes of compulsory immobilization (laying their heads down on their desks), Franklin found that although immobilized subjects produced significantly more humans in movement, they did not produce more humans. Further, when the scores for humans and humans in movement were combined, the immobilized subjects did not produce significantly more human content than did the non-immobilized subjects.

Other Studies of the Kinget Drawing Completion Test

Jamison (1959) made a cross-culture study of drawings of Navajo and white children in the third and sixth grades and found that white children drew more human figures than did Navajo children. Although IQ scores were not obtained, the Navajo children were, in general, from one to two years older than the white children. Jamison concluded:

> A study in relation to age with intelligence controlled, rather than use of grade comparisons, might be more fruitful.

Laird (1964) studied creativity and imagination among gifted (above 130 IQ) and non-gifted (below 85 IQ) high school students. He tested them on the Guilford-Zimmerman Temperament Survey, the Kuder Vocational Preference Record, and the Kinget Drawing Completion Test. He found no statistically significant differences on the Guilford. On the Kuder, the only significant difference occurred on the variable, Literary, with the gifted indicating, as expected, a greater preference for reading and writing than did the non-gifted (pp. 85-86).

Laird found statistically significant mean differences in imagination and creativity as measured by the Kinget. To evaluate the Kinget drawings, Laird used a zero-to three-point scale. He rated the drawings for evidences of Combinative Imagination, Creative Imagination, and Total Imagination. To assess Combinative Imagination, Laird set up criteria for rating drawings containing these six variables: Physiognomy, Ornaments, Style, Organization, and Symmetric Abstraction. Laird scored both animals and humans as Physiognomy, and rated highest those drawings which were abundantly detailed, showing clothing, sex, personality, emotion, readily attributable characteristics, and activity.

In scoring Ornaments, Laird rated highest those ornaments which he considered to be most rare. For Style, Laird rated highest the most extremely constricted setting of the object in the drawing. In scoring for Organization, Laird rated highest a three-dimensional drawing which showed structure, logical planning, and adequate arrangement of the elements of the drawing, particularly as to depth in the dimension, with a strong realistic or lifelike quality. Symmetric Abstractions were scored for complexity and elabpration.

Laird defines Combinative Imagination as that which is "based on perception and oriented towards visible reality" (Laird, p. 80). Laird defines Creative Imagination, on the other hand, as being "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." To assess Creative Imagination, Laird set up criteria for rating drawings containing these five variables: Expansion, Fantasy, Originality, Asymmetric Abstraction, and Dark Shading (pp. 80-81).

In scoring for Expansion, Laird scored highest such things as spreading or scattering over the drawing area; implication of an extension beyond the drawing area, such as part of an object, an interior, or a landscape; and inclusion of elements of the whole world or the universe, such as a neighborhood or a planet or star. The greater the concept of space implied, the higher points Laird assigned the drawing. Laird scored as Fantasy all fanciful drawings, giving the highest number of points to the most original fantasies, including those drawings which were primarily symbolic. In scoring for Originality, Laird considered uniqueness, giving the highest number of points to a drawing which was not likely to occur more than once. The highest scores were given to the Asymmetrical Abstractions which showed the greatest degree of harmony and integration, particularly those using shading and curved lines. Shading, both Light and Dark, was rated according to its intensity and to the amount of area, either for one drawing or for a whole set, in which shading was utilized. Laird found that on all three variables the gifted group showed greater imagination and creativity than did the non-gifted group (extremely high *t* values and statistically significant F ratios (.01).

In addition to Franklin's study cited heretofore, a number of other studies have been made on the influence which inhibition of a subject has on his perceiving or drawing humans and human movement. Murfett (1962) studied the relationship between scores on the California Inhibition Test and the production of humans and humans in movement on the Kinget, as well as the perceiving of *H* and *M* on Cards I, II, III, and VII of the Rorschach. She hypothesized that poor inhibitors, as shown by the California Inhibition Test, would draw fewer humans and humans in movement on the Kinget and would perceive fewer *H* and *M* on the Rorschach cards than would good inhibitors. These hypotheses were not supported. However, there is considerable controversy as to whether the California Inhibition Test is a dependable measure of the inhibition process. Other studies have shown a significant relationship between imposed inhibition-producing tasks and measures of fantasy activity.

Harris (1963) also studied the relationship between inhibition and fantasy production. He used drawing of human content on the Kinget as a measure of fantasy. To study the influence of imposed inhibition on the production of human content, he required half the subjects (the experimental group) to perform a slow-writing task before beginning the Kinget. He found that the group subjected to prior inhibition scored significantly higher for human content on the Kinget than did the non-inhibited (control) group. He concluded that the results of his study supported the relationship between inhibition and fantasy production hypothesized by Rorschach and others.

Pepper (1964) also used the slow-writing task as an inhibiting factor for the experimental group in his study of the influence of imposed inhibition on the production of human movement and non-human movement on the Kinget. In the production of human movement, Pepper found no significant difference between the control and the experimental groups. However, he found that the inhibited group produced significantly more total movement.

Studies of the Kinget by Sluyter (1964), Wyche (1965), and Swink (1965) are somewhat less closely related to the present study. However, since Sluyter studied reliability and validity, Wyche studied creativity, and Swink studied human content production, their studies help to throw light on the present study.

Sluyter (1964) completed two experiments on the Kinget, one concerned with its validity and another testing its reliability. Sluyter found that many of Kinget's hypotheses did not prove to be reliable when the same subjects were tested, with intervals of time between the testing of the subjects. Concerning his test on validity, Sluyter states:

> . . . 16 married subjects were administered the Kinget test and the Minnesota Multiphasic Personality Inventory (MMPI) in order to determine any relationship between a masculine-feminine orientation on the Kinget test and on the MF scale of the MMPI. No strong relationships were found for either males or females, giving only a weak indication of the validity of Kinget's masculinity-femininity concept. A t-test indicated significant differences between the Means of male and female scores.

In relation to this finding, it should be noted, however, that there is considerable controversy as to the validity of the masculinity-femininity concept as tested by the MMPI.

Wyche (1965) compared certain components of the Guilford-Zimmerman Temperament Survey and the Kinget Drawing Completion Test as to femininity and creativity. Wyche states (p. 17):

> The results indicate no relationship between Kinget femininity and creativity, between Kinget femininity and GZTS femininity, and between GZTS femininity and Kinget creativity.
>
> In answer to the question as to whether there is a relationship between femininity and creativity, as far

> as this research is concerned, there is no relationship. One possible explanation for the fact that no relationship appeared is that the scales are not adequate measures of either creativity or femininity. . . . This finding is consistent with the findings of Barrow and Zuckman (1960), who questioned the construct validity of the masculinity-femininity scale of the GZTS.

Swink (1965) studied the validity of some common interpretations of human content production on the Kinget and human movement perception on the Rorschach test. Swink's study attempted to assess whether or not such production reflected capacity for direct contact and eagerness for dealing with people, social interest, and interpersonal relatedness. Swink used French's Test of Insight as an independent measure of the desire to establish and maintain warm and friendly interpersonal relations (affiliation motivation). Swink attempted to obtain further validating evidence by comparing a group of deaf children to a group of hearing children, on the hypothesis that the deaf children had been limited in establishing and maintaining interpersonal relatedness. Swink did not find statistically significant differences between the two groups, except that the deaf subjects scored significantly higher on affiliation motivation. Of particular interest to the present study is Swink's statement (p. 37):

> The assumption that both human content scores on the Drawing Completion Test and human movement scores on the Rorschach test measure "fantasy production" was challenged by their low correlation.

House Tree Person Test
Goodenough Draw a Man Test
and
Machover Draw a Person Test

For the educator, one of the most significant studies of the value of projective tests for predicting academic success was done by Bailey (1956). In delineating his problem, Bailey states (p. 2):

> The present study is based on the assumption that academic performance in reading represents an adjustment to an academic and social situation . . . If projective tests can be interpreted adequately to differentiate levels of intelligence or to identify sufficient maladjustment to impair intellectual functioning, they could be used to ascertain the potentially strong and weak readers in a class.

Bailey used the House Tree Person Test, the Goodenough Draw a Man Test, and the Machover Draw a Person Test. These tests are relatively simple techniques. On the House Tree Person Test, for example, the subject is asked to draw a house, a tree, a person; then asked to draw a person of the opposite sex.

As in the administration of the Kinget, instructions are as non-leading as it is possible to make them--that is, the usual answer to all questions by the subject is that he may draw as he wishes and that skill in drawing is unnecessary. The only additional comment (and it is a suggestion, rather than a specific instruction) is this: When the subject stops his drawing of a person, if he has drawn only a head, a head in profile, or a stick figure, the examiner suggests that he try to draw a full figure. However, if he omits any parts of the body, such as hands, feet, or facial features, the examiner accepts the drawing without comment, inasmuch as such omissions are significant.

In discussing his study, Bailey states (p. 18):

> The specific purpose of this study was to discover if the specified projective tests [the House Tree Person Test, the Goodenough Draw a Man Test, and the Machover Draw a Person Test] could be used to successfully predict the academic reading success of students at the elementary school level. Additional purposes were to determine if the different drawings analyzed in making the selections and the differences of training possessed by the selecting groups were factors of statistical significance affecting the selections of readers and non-readers at the second, fourth, and sixth grade levels.

Bailey conducted the study in second, fourth, and sixth grades in Norman, Oklahoma. As subjects, Bailey used students selected by the teachers as their five least proficient and five most proficient readers. Each of the three projective tests was given individually to each student.

Two students completing work toward their doctorate in clinical psychology at the University of Oklahoma acted as psychologists to judge the drawings. The other judges were classroom teachers of the selected grades, who were enrolled at the University and who were willing to participate in the study.

The drawings of women, men, houses and trees at each grade level were lettered for identification and displayed in a large room, the order of the drawings being changed for the different groups of judges. The judges--

psychologists and second, fourth, and sixth grade teachers--viewed the drawings, exchanging no comments. All the judges "selected five readers and five non-readers respectively from the drawings of women, men, houses, and trees at the second, fourth, and sixth grade levels" (Bailey, 1956, p. 25). After the first judging, the teachers who were willing to participate in a second judging were divided into a control and an experimental group. Bailey states (p. 20):

> The control group included fourteen of the teachers who completed the same test a second time without additional training or experience. The selection of this group was their willingness to participate again. The experimental group included fourteen of the teachers who completed the same test a second time as the group with some training. This group [fourteen] received one hour of instruction from Dr. P. T. Teska, Director of Special Education at the University of Oklahoma. The instruction emphasized the recognition and evaluation of characteristics in children's drawings. According to Dr. P. T. Teska, the instruction emphasized developmental sequence and maturity level . . . .

In a summary of his findings, Bailey states (pp. 77-78):

> The results of the study . . . indicate that the House Tree Person, the Goodenough Draw A Man, and the Machover Draw a Person Tests can be used as a method of predicting reading success in an elementary school. The results indicate that the highest number of correct predictions identifying readers and non-readers at the second grade was attained by a trained group basing its selections upon the drawing of a woman, . . . at the fourth grade . . . upon the drawing of a tree, . . . at the sixth grade . . . upon the drawing of a man.

Bailey states further (p. 78):

> The fact that the null hypotheses were rejected at a number exceeding the expectation of chance at the three grade levels indicates the instances where the

specified projective tests can be used to select significantly readers and non-readers.

In this connection, it is particularly significant to note the degree of accuracy with which trained psychologists, as well as teachers with only one hour of training, differentiated the readers from the non-readers by viewing the drawings. In their differentiation of readers from non-readers, based on the drawings of men and women, the psychologists made <u>no</u> errors at the second grade level, and their correct selections were "significant at better than .01 level of confidence" at the fourth and sixth grade levels (pp. 90-96). The teachers with no training were highly accurate at the second grade level, and the teachers with only one hour of instruction were almost entirely accurate at the second grade level, although all judges were less accurate at the fourth grade level, and still less accurate at the sixth grade level. Considering the fact that some of the criteria for evaluating the drawings bear some relation to the physical size of the child, it would be interesting to study the drawings of older children to determine whether different criteria could be found for evaluating their drawings--criteria which would show significant differences in the drawings of readers and of non-readers, even among the older children.

Berdie (1945, pp. 288-95) reported a study of the literature on the Goodenough Draw A Man test. He stated that drawings made by mentally defective to dull normal adults may be used as an indication of their intellective level. He suggested, however, that drawings made by normal and superior adults may indicate artistic ability rather than intellective level.

Gunther and Havighurst (1946, pp. 50-63) used the Goodenough Draw A Man Test as a measure of intellective level, administering it to children, 6 to 11 years old, in six different Indian tribes and in a small white community. According to the criteria for judging the drawings, the Indian children obtained higher IQ scores.

Guertin and Sloan (1948, pp. 425-426) studied House Tree Person drawings of mental defectives with the Wechsler-Bellevue IQ scores of the same subjects. They found that in all comparisons, the House Tree Person scores were significantly higher than the Wechsler-Bellevue scores, and suggested that there is a need for further study of the reliability of drawings as a measure of intelligence, particularly for adults. The Metropolitan Reading Readiness Test, which is widely used at kindergarten and first grade, includes the drawing of a man. Thetford (1952) reported that a study of normal adolescents and of those exhibiting deviant behavior revealed that the normal subjects produced more human activity in their drawings than did the deviates.

The Inhibition Process

Learning is usually defined as a change in behavior or a changed response to a stimulus or stimulus pattern. In the stimulus-response theory of learning, response to the stimulus is a change in activity. When the response is the stopping or checking of an activity, such response is called inhibition. The inhibition process operates in the learning process; exactly the manner in which it operates has been the subject of much discussion and experimentation.

Harlow, after more than twenty-five years of research with animals and the learning process in the Wisconsin Primate Laboratory, concluded that "the single learning process is inhibitory, and that learning consists only in the elimination of incorrect response tendencies elicited in the learning situation" (Koch, 1959, p. 531). In leading up to this conclusion, Harlow discussed his Error Factor theory, and stated:

> In summary it may be stated that in spite of the limited research conducted thus far on EF [Error Factor] analysis, a number of interesting phenomena are evolving. It is a reasonable hypothesis that the suppression of all EF's defines perfect learning, and that learning is nothing but suppression or inhibition of EF's. . . .
>
> The development of the thesis that learning involves nothing other than the elimination of responses and response tendencies inappropriate to a particular learning situation [Error Factors] leads us to question the commonly held concept that learning is the resultant of two processes, excitation, which follows

reward, and inhibition, generated when no reward is received (Koch, p. 526).

Many studies have been made in an attempt to find a relationship between the inhibition process and the reversal of the reversed N on the Digit Symbol Test, and between the inhibition process and the production of human movement responses on the Rorschach. John Mourly Vold (Piotrowski, 1957, p. 126 and pp. 146-147) found that immobilizing physical activity of a subject who was asleep resulted in his dreaming of expansive movement. Rorschach was greatly influenced by Vold's findings and concluded that M responses were related to the movement content of dreams and that the inhibition of overt motor activity tended to increase the production of M. He felt that the increased production of M as a result of inhibition substantiated his belief that the psychological mechanisms represented by M inhibit motor behavior in real-life situations (Rorschach, 1942).

Singer and his collaborators have made extensive studies of the relationship between the inhibition process and the production of M. Singer, Meltzoff, and Goldman, (1952) concluded that inhibiting external movements at the time of administering the Rorschach results in greater production of M. They relied upon the sensory-tonic field theory of perception of Werner and Wapner. Werner and Wapner (1956, p. 195) theorized that sensory-tonic energy (that is, available energy) may be released through various channels and that if "sensory-tonic energy is blocked from being released through bodily-motor channels, it should find expression in heightened perceptual motion."

Singer (1955, p. 263) theorized that persons who are capable of extensive impulse control will reflect a low threshold for perception of motion. Spivack, Levine, and Sprigle (1959, p. 428) concluded that habits of inhibition develop in childhood, and that as the developmental process of thinking increases with age, inhibition of the expression of impulses increases, so that thinking "becomes increasingly a substitute for direct, impulsive action and can serve as a partial discharge of tensions." Rapaport, Gill, and Schafer (1946, p. 213) concluded that a subject who produces many human movement responses is superior in his ability to inhibit responses.

Franklin (1963, p. 4) states:

> . . . the classroom teacher is quite well aware of the necessity for maturity before a child is able to behave in a manner consistent with the demands of society. There may be common relationships between ego integration, maturity, ability to inhibit, ability to adjust adequately in interpersonal relationships and ability to handle humans and human activity in a testing situation.

Meltzoff and Levine (1954) found that college students who demonstrated greater ability to inhibit physical activity voluntarily were better able to inhibit learned word associations and to produce new words in less time than were students who exhibited greater difficulty inhibiting physical activity. Levine and his associates have made a number of studies comparing the reversed N on the Digit Symbol Test, the production of M on the Rorschach inkblot test, and IQ scores. The results of these studies must be considered doubtful, in part, however, inasmuch as the Wechsler-Bellevue Intelligence Scale was used to obtain the IQ score. Since the Digit Symbol Test is a part of this Scale, the reversers would automatically be assigned a lower IQ score on this test than would non-reversers. Furthermore, all these studies used subjects who were identified as psychiatric or disturbed; it is doubtful that such subjects could be considered as representative.

Levine, Glass, and Meltzoff (1957) administered the Digit Symbol Test, the Rorschach cards, and a word association test of cognitive inhibition to psychiatric outpatients. A difference of nine points in mean IQ was found between the reversers and the non-reversers, the reversers making the lower scores. They suggested that reversers were unable to inhibit the inappropriate response to the reversed N; that is, that subjects who produce the familiar N instead of the reversed N do so because they are unable to delay or to inhibit the impulsive response. The experimenters hypothesized that reversers would produce fewer M responses than would non-reversers, and that reversers would be less able than non-reversers (good inhibitors) to inhibit a learned response on the word association test and to produce quickly a new word in its place. They found that reversers produced significantly fewer M on the Rorschach, and that reversers took a significantly longer period of time to produce the new word on the word association test.

CHAPTER II

PROBLEM

Background of the Problem

Although it has been well established that numerous verbal tests are valid and reliable predictors of intellective level and of academic success, educators and psychologists who work with them regularly recognize that their value is often grossly over-rated. Dr. Anton Thompson, Director of Research for the Long Beach Unified School District, cites a number of authorities who warn against undue reliance on mental ability tests. In the School Bulletin of the Long Beach Unified School District, January 14, 1966, p. 2, Dr. Thompson quotes from the Examiner's Manual for the Henmon-Nelson Tests of Mental Ability:

> Test users are . . . cautioned against attaching overwhelming importance to any test score from a single administration of a test or test battery, and unsupported by any other data. The human being is exceedingly complex. Categorizations and predictions of human behavior should be made with caution and with a humility based on the realization that at best we are more nearly ignorant than informed about any given individual.

Many factors which enhance or hamper a student's academic success are difficult to diagnose. Educators are relentlessly searching for clues which will help them gain insight into the behavioral--or "functioning"--problems exhibited by students. Without valid and reliable diagnostic tests, educators are faced with an insurmountable barrier in attempting to find solutions for the problems posed by these factors, however inadequate the results of any single test may be.

The projective techniques of testing are designed to induce the subject to make a kind of response which is different from that which he makes on a more verbal test, a kind of response which may add to an examiner's insight into the subject's inner self or his self-concept. Although numerous books and articles have been written about them, few of the projective techniques have been sufficiently validated by experimental studies, and the educator is justifiably reluctant to depend upon them. Like the experimental psychologist, he prefers to rely upon tests which lend themselves to explicitly testable hypotheses and operational translation of the test results.

Macfarlane and Tuddenham (Anderson, 1951, pp. 26-27) reported that only fifteen of nearly eight hundred bibliographical references on the Rorschach appeared to be concerned primarily with validation. An examination of validity studies reported in recent years in psychological journals reveals no change in this trend. Experimental investigations obviously are needed if the educator is to rely on inferences drawn from the projective tests.

In discussing the need for validation of projective techniques, Macfarlane and Tuddenham (pp. 32-33) stated:

> Being multi-dimensional tests and tapping perceptual thresholds, they offer the hope of predicting significant segments of behavior from the multidimensional complex of actual life. This hope will be actualized or trimmed down to actual size only after years of responsible research.

Bailey (1956) found that drawings of houses, trees, men, and women by children at second, fourth, and sixth grades could be used with significant accuracy to predict reading success.

Rorschach (1942), Beck (1961), Piotrowski (1957), and others have stated that the higher the intellective development of the subject, the more Humans (H) and Humans in Movement (M) he will produce on the Rorschach inkblot test. Therefore, the assumption is frequently made that the production of humans and human movement on the Kinget is an indicator of intellective development. These assertions have not been sufficiently validated either for the Rorschach or for the Kinget.

The present study was undertaken in an effort to determine whether, in a controlled experimental study, these assumptions will be verified for the Kinget. In contrast to the disquiet which the so-called verbal tests arouse in most subjects, the relatively unstructured Kinget appears to hold a fascination for almost all subjects of all ages and intellective levels. Whether or not the results of the present study clearly demonstrate that the production of human movement on the Kinget is a developmental process, psychologists and educators will have evidence that such assertions are or are not substantiated by controlled experiments, whatever other values the projective tests, and the Kinget in particular, may prove to have.

Statement of the Problem

The problem in this study was to ascertain, in a controlled experiment with public school pupils, (1) whether younger subjects produce as many human movement responses on the Kinget Drawing Completion Test as do older subjects, (2) whether subjects with lower IQ scores produce as many human movement responses as do subjects with higher IQ scores, (3) whether reversers of the reversed *N* on the Digit Symbol Test of the Wechsler-Bellevue Intelligence Scale, Form I, produce as many human movement responses on the Kinget as do non-reversers, and (4) whether non-immobilized subjects produce as many human movement responses as do immobilized subjects.

Hypotheses

It was hypothesized that the production of human movement responses on the Kinget is not a developmental process: (1) that younger subjects produce as many as do older subjects, and (2) that subjects with lower IQ scores produce as many as do subjects with higher IQ scores. It was further hypothesized (3) that reversers produce as many human movement responses on the Kinget as do non-reversers (subjects who inhibit the inappropriate response to the reversed N), and (4) that non-immobilized subjects produce as many as do immobilized subjects. On the basis of these general null hypotheses, the following specific null hypotheses were subjected to tests for statistical significance:

1. Normal 15-year-old subjects produce as many human movement responses on the Kinget as do gifted 15-year-old subjects.

2. Retarded 15-year-old subjects produce as many human movement responses on the Kinget as do gifted 15-year-old subjects.

3. Normal 13-year-old subjects produce as many human movement responses on the Kinget as do gifted 13-year-old subjects.

4. Retarded 13-year-old subjects produce as many human movement responses on the Kinget as do gifted 13-year-old subjects.

5. Normal 11-year-old subjects produce as many human movement responses on the Kinget as do gifted 11-year-old subjects.

6. Retarded 11-year-old subjects produce as many human movement responses on the Kinget as do gifted 11-year-

old subjects.

7. Normal 9-year-old subjects produce as many human movement responses on the Kinget as do gifted 9-year-old subjects.

8. Retarded 9-year-old subjects produce as many human movement responses on the Kinget as do gifted 9-year-old subjects.

9. Normal subjects produce as many human movement responses on the Kinget as do gifted subjects.

10. Retarded subjects produce as many human movement responses on the Kinget as do gifted subjects.

11. Retarded 15-year-old subjects produce as many human movement responses on the Kinget as do normal 15-year-old subjects.

12. Retarded 13-year-old subjects produce as many human movement responses on the Kinget as do normal 13-year-old subjects.

13. Retarded 11-year-old subjects produce as many human movement responses on the Kinget as do normal 11-year-old subjects.

14. Retarded 9-year-old subjects produce as many human movement responses on the Kinget as do normal 9-year-old subjects.

15. Retarded subjects produce as many human movement responses on the Kinget as do normal subjects.

16. 13-year-old subjects produce as many human

movement responses on the Kinget as do 15-year-old subjects.

17. 11-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects.

18. 9-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects.

19. Younger subjects produce as many human movement responses on the Kinget as do 15-year-old subjects.

20. 11-year-old subjects produce as many human movement responses on the Kinget as do 13-year-old subjects.

21. 9-year-old subjects produce as many human movement responses on the Kinget as do 13-year-old subjects.

22. Younger subjects produce as many human movement responses on the Kinget as do 13-year-old subjects.

23. 9-year-old subjects produce as many human movement responses on the Kinget as do 11-year-old subjects.

24. 15-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 15-year-old subjects who are non-reversers.

25. 13-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 13-year-old subjects who are non-reversers.

26. 11-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 11-year-old subjects who are non-reversers.

27. 9-year-old subjects who are reversers produce as many human movement responses on the Kinget as do

9-year-old subjects who are non-reversers.

28. Reversers produce as many human movement responses on the Kinget as do non-reversers.

29. 15-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 15-year-old immobilized subjects.

30. 13-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 13-year-old immobilized subjects.

31. 11-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 11-year-old immobilized subjects.

32. 9-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 9-year-old immobilized subjects.

33. Non-immobilized subjects produce as many human movement responses on the Kinget as do immobilized subjects.

CHAPTER III

METHOD

Selection of Subjects

This study included 256 subjects from the elementary, junior high, and high schools of the Long Beach Unified School District in Long Beach, California. To avoid overlapping, it was determined to select subjects whose ages allowed at least a one-year interval between the oldest of one group and the youngest of the succeeding group. The only exception to this procedure occurred in the selection of retarded 11-year-olds, at which age, 4 of the 24 retarded subjects were two to three months older than the remainder of the 11-year-old subjects.

Subjects were selected according to these criteria:

Age Range

1. 15-year-olds: 66 subjects. Median age, 15-6. Range, 15-0 to 18-3. (All subjects ranged from 15-0 to 16-2 except 9 of the retarded subjects.)
2. 13-year-olds: 61 subjects. Median age, 13-7. Range, 13-1 to 14-0.

3. 11-year-olds: 64 subjects. Median age, 11-8. Range, 11-2 to 12-4.
4. 9-year-olds: 65 subjects. Median age, 9-8. Range, 8-5 to 10-2. (All subjects ranged from 9-4 to 10-1 except 5 of the 22 retarded subjects.)

Other Criteria for Selection

At each age and IQ range, approximately half of the subjects were boys and half were girls. At each age level, approximately one-third had been identified as gifted, one-third as normal, and one-third as mentally retarded.

The Long Beach District has some special classes for students who have been identified as gifted or as retarded. Gifted 9-year-olds have scored at least 130 IQ on Binet. Students at the other ages have been identified as gifted if they have scored in the top 2% on an IQ test and on either a mathematics or a reading test. In addition, each student has been considered and approved by a committee composed of the principal, the teacher, and the counselor at the school which the student is attending. This committee considers all the available evidence, including the test scores. If the student is thus identified as gifted, a conference is held with his parents, who must give their consent for the child to be put into any special classes for the gifted students.

Special classes are also set up for educable retarded children within the general range of 60 to 75 IQ on an individual intelligence test administered by the school psychologist. As in screening the gifted, each of the children in the Special Training classes has been considered by a committee composed of the principal, the teacher, and the counselor. The committee considers not only the IQ score and recommendation by the testing psychologist, but also the student's current achievement, academically and socially, the results of a medical examination, and any other evidence available which points to the fact that the primary problem is one of mental retardation. In addition, parent consent must be obtained. Gifted and retarded subjects for this study were selected from these previously identified students.

Normal subjects were selected whose IQ scores ranged between 95 and 105 on group tests, and whose mathematics and reading achievement scores placed them within nine months of their grade level. Further, wherever possible, the teacher, principal, or counselor was requested to eliminate from the list of prospective subjects any students whom they would consider as not performing or behaving in normal fashion. Table 57 in the Appendix summarizes the numbers and divisions of subjects, and Tables 58 and 59 give complete data on the immobilized and non-immobilized subjects, the sex, age, and IQ score of each subject, and identify those who were reversers.

Reversers and Non-reversers

Following the procedures of Cornell and Coxe (1934), Levine, Glass, and Meltzoff (1957), and Franklin (1963), a subject who reversed one or more of the reversed N's on the Digit Symbol Test was considered to be a reverser. Others were considered to be non-reversers.

Experimental Procedure

Administration of the Tests

Subjects were tested in groups of 3 to 20 at one time. Younger subjects were tested in groups of 3 to 7, subjects in the middle age ranges were tested in groups of 5 to 10, and subjects in the older range were tested in groups of 20. In every instance, subjects were seated far enough apart that they could not see each other's papers. Usually, the testing was done in the school cafeteria; occasionally a large classroom was used.

At each testing period, all subjects first were given the Digit Symbol Test. Administration of this test to a group instead of individually was made possible in this manner. An opaque card was cut and paper-clipped to the Digit Symbol Test in such a manner that the card obscured all the test except the sample items. The subjects were given standard instructions for completing the test and were asked to put up their hands when they had completed the samples. The accuracy of the samples was checked with each student, against a key. When the samples had been accurately completed, the obscuring cards were removed and the signal to complete the test was given.

The purpose of administering the Digit Symbol Test was to determine whether or not the subjects would respond inappropriately to any of the reversed N's. Therefore, it was determined to allow the normal and gifted subjects two minutes instead of the one-and-a-half minutes prescribed in the standard directions. Because the retarded subjects work more slowly, they were allowed two-and-a-half minutes. This additional time allotment was necessary to give the subjects sufficient time to respond, whether appropriately or inappropriately, to most of the reversed N's.

Inasmuch as Franklin (1963) found that compulsory immobilization (having the subjects put their heads down and rest for five minutes) increased the number of human movement responses produced by fifth-grade students, this compulsory immobilization procedure was followed for half the subjects (the experimental group) of each sex, and at each age and IQ level. The immobilization factor was omitted for the control group.

When the Digit Symbol Test had been picked up, each subject was provided with a thin cardboard sheet to use as padding under the Kinget and a No. 2½ pencil. The Kinget Drawing Completion Test was laid face down in front of each subject. Subjects were asked not to write their names on the Kinget, but to write only "Boy" or "Girl" and their birth dates. Instructions were given for completion of the Kinget. (See Appendix.) Subjects who were being immobilized were asked to put their heads down on their desks and to remain quiet for five minutes. The non-immobilized subjects proceeded immediately with the drawings.

When a subject had completed his drawings, he was given an answer sheet containing three lines for discussion of each drawing. (See sample in Appendix.) He was asked to write "Boy" or "Girl" and his birth date--<u>not</u> his name--on this sheet and to "tell all about" each drawing. It was anticipated that subjects in the younger age groups, particularly among the retarded subjects, would be unable to write their discussions. In such cases, the subject was asked to tell about his drawings, and his answers were written for him. As in administration of the Binet, if a subject gave an inadequate answer, he was asked, "Can you tell me any more about it?" This question was asked about any inadequate answer, not just those which had to do with human or human movement responses. This procedure was made possible by the fact that these subjects were tested in very small groups, were widely scattered throughout the room, and were asked to dictate their answers in a low voice. If any subject left his chair or gave any indication that he was picking up ideas from other subjects, his test was discarded after he left the testing room.

It should be noted that giving the subjects a feeling of anonymity proved to be a very important factor, inasmuch as many of the subjects inquired whether their drawings would be seen by parents or teachers. The subjects appeared to be reassured by the reminder that their names did not appear on their drawings. Further, no effort was made to learn a subject's name. Otherwise, every effort was made to establish a relaxed, friendly atmosphere. The word "test" was never used; instead, the words "drawing" or "research project" were used. Answers to all questions were to the effect that there were no right or wrong answers, and that the subject might draw--or "tell"--anything he wished. Extreme caution was taken to avoid "leading" any subject.

The inhibition process has been widely considered to be an influencing factor in subjects' scores on IQ tests, on their perceiving or producing human movement in projective tests, and on the production of the appropriate response to the reversed _N_ in the Digit Symbol Test. Two approaches to the study of the influence of inhibition were used. The first was compulsory immobilization of half the subjects (the experimental group) prior to administration of the Kinget. This experimental group (immobilized subjects) was matched to the control group (non-immobilized subjects) by chronological age, IQ level, and sex. The second approach was administration of the Digit Symbol Test to all subjects to ascertain which subjects would inhibit the inappropriate response to the reversed _N_. Subjects who reversed none of the ten reversed _N_'s were considered to be good inhibitors and were classified as non-reversers. Subjects who reversed one or more were considered to be poor inhibitors and classified as reversers.

Scoring

The Digit Symbol Test was scored on only one item: the reversed _N_, which appears ten times in the test. The Kinget was scored for only one item: human movement. Procedures established by Piotrowski (1957) for scoring Human Movement (_M_) on the Rorschach were followed. A drawing was scored as human movement if (1) the subject drew a human figure or a part of a human figure which was obviously performing some activity, such as a foot kicking a ball; or (2) the subject, in his discussion of the drawing, said there was human movement; or (3) his response indicated some human emotional involvement. For example, if the subject said, "This is a sad face," it was scored as human movement, but if he said, "This is a face," it was not scored; if the subject said, "This is a stairs where the children go up to bed," it was scored as human movement even though no figure was drawn on the stairs; if the subject said, "This is a girl with a hairdress _like I want_," it was scored as human movement, but if the subject said, "This is a girl with her hair in a ponytail," it was not scored. This kind of scoring requires drawing a fine line at times. For example, a response involving the use of a verb or the present participle of a verb was usually scored as human movement, such as, "This is a girl wearing a new dress." However, if the response was "This is a girl in a new dress," it was not scored.

CHAPTER IV

RESULTS

Table 57 in the Appendix summarizes the more complete information contained in Tables 58 and 59. Table 58 lists the immobilized subjects (the experimental group) by sex, chronological age, and IQ scores, and identifies the subjects who were reversers. Table 59 lists the same information for the non-immobilized subjects (the control group). These tables also show the tests from which the IQ scores were obtained. It will be noted that there are approximately equal numbers of immobilized and non-immobilized subjects and of boys and girls. Furthermore, there are approximately equal numbers of retarded, normal, and gifted subjects of each sex at each of the four age levels: 9-year-olds, 11-year-olds, 13-year-olds, and 15-year-olds.

Tables 60 through 67 show the number of human movement responses of the subjects: immobilized and non-immobilized, retarded, normal, and gifted, boys and girls, at each age level. These tables also identify the subjects who were reversers, showing the number of human movement responses each reverser produced and the number of N's he reversed. Following the procedures established by Cornell and Coxe (1934), Levine, Glass, and Meltzoff (1957), and Franklin (1963), a subject was identified as a reverser if he reversed one or more of the *N*'s on the Digit Symbol Test.

Tables 60 through 67 in the Appendix show that the most significant difference in the number of human movement responses produced by the subjects was between 2 and 3. Therefore, the cutting point for subjects who produced more as against those who produced fewer human movement responses was determined as 0-2 as against 3-8.

The nature of the data lent itself to two-by-two contingency tables. The Fisher exact probability test was used to test for significance the data in all tables in which the total number of subjects was no more than 30. If the number of subjects exceeded 30, the data were tested for significance by the chi-square test. In all the tables for which the chi-square test was used, if any cell of the table contained an expected frequency of less than 10, the chi-square test corrected for continuity was used (Siegel, 1956, p. 107). These were two-tailed tests, with one degree of freedom. The criterion value for all tables for accepting or rejecting the hypotheses was set at the .05 level of significance. The chi-square value at this level is 3.84. Therefore, a hypothesis was rejected when the chi-square test resulted in a value less than 3.84: *p* (probability of chance occurrence) greater than .05.

Cochran (1954) recommended that when the number of subjects is greater than 40, even though the expected frequency in any cell is less than 5, the chi-square test corrected for continuity should be used. When the number of subjects is between 20 and 40, the chi-square test may be used if all expected frequencies are 5 or more. None of the tables in this study for which the chi-square test was used contained any expected frequency of less than 5.

Siegel (1956, p. 99) discussed the computational difficulty of determining the exact values of p in the Fisher test when the smallest cell value is even as large as 2. He stated that when significance levels will suffice, the significance of an observed set of values in a two-by-two contingency table may be obtained from the "Table of Critical Values of D (or C) in the Fisher Test" (Siegel, 1956, pp. 256-270). This Table may be used for no more than 30 subjects. The Table does not give exact probabilities but gives the level of significance of observed values of marginal totals and cells. If the observed value of the specified cell is equal to or less than the value given in the table under the desired level of significance, then the observed data are significant at that level. If the observed value of the specified cell is greater than the value given in the table, the observed data are not significant. Siegel (1956, p. 99) states that the significance levels given in this Table are approximate, but that "they err on the conservative side." Each contingency table herein tested by the Fisher test was followed by the notation that "p (obtained probability)" was less than or greater than .05, in order that it would be clear that the probability of chance occurrence was obtained from the Table, not figured exactly.

In Hypothesis 1 it is stated that normal 15-year-old subjects produce as many human movement responses on the Kinget as do gifted 15-year-old subjects. Tables 60 and 61 in the Appendix show the number of human movement responses by gifted and normal 15-year-old subjects. Table 1 shows a chi-square value is not statistically significant. Therefore, the null hypothesis that normal 15-year-old subjects produce as many human movement responses on the Kinget as do gifted 15-year-old subjects is accepted.

In Hypothesis 2 it is stated that retarded 15-year-old subjects produce as many human movement responses on the Kinget as do gifted 15-year-old subjects. Tables 60 and 61 in the Appendix show the number of human movement responses by gifted and retarded 15-year-old subjects. Table 2 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded 15-year-old subjects produce as many human movement responses on the Kinget as do gifted 15-year-old subjects is accepted.

In Hypothesis 3 it is stated that normal 13-year-old subjects produce as many human movement responses on

TABLE 1.--Chi-square test (corrected for continuity) of gifted and normal 15-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects		
	Gifted	Normal	Total
0 - 2	14	14	28
3-8	7	10	17
Total	21	24	45

Chi square = .07, $p > .05$

TABLE 2.--Chi-square test (corrected for continuity) of gifted and retarded 15-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects		
	Gifted	Retarded	Total
0 - 2	14	14	28
3 - 8	7	7	14
Total	21	21	42

Chi square = .11, $p > .05$

the Kinget as do gifted 13-year-old subjects. Tables 62 and 63 in the Appendix show the number of human movement responses by gifted and normal 13-year-old subjects. Table 3 shows a chi-square value which is not statistically significant. There, the null hypothesis that normal 13-year-old subjects produce as many human movement responses on the Kinget as do gifted 13-year-old subjects is accepted.

In Hypothesis 4 it is stated that retarded 13-year-old subjects produce as many human movement responses on the Kinget as do gifted 13-year-old subjects. Tables 62 and 63 in the Appendix show the number of human movement responses by gifted and retarded 13-year-old subjects. Table 4 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded 13-year-old subjects produce as many human movement responses on the Kinget as do gifted 13-year-old subjects is accepted.

In Hypothesis 5 it is stated that normal 11-year-old subjects produce as many human movement responses on the Kinget as do gifted 11-year-old subjects. Tables 64 and 65 in the Appendix show the number of human movement responses by gifted and normal 11-year-old subjects. Table 5 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that normal 11-year-old subjects produce as many human movement responses on the Kinget as do gifted 11-year-old subjects is accepted.

In Hypothesis 6 it is stated that retarded 11-year-

TABLE 3.--Chi-square test (corrected for continuity) of gifted and normal 13-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Normal	Total
0 - 2	9	14	23
3 - 8	11	7	18
Total	20	21	41

Chi square = 1.15, $p > .05$

TABLE 4.--Chi-square test (corrected for continuity) of gifted and retarded 13-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Retarded	Total
0 - 2	9	15	24
3 - 8	11	5	16
Total	20	20	40

Chi square = 2.61, $p > .05$

TABLE 5.--Chi-square test (corrected for continuity) of gifted and normal 11-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Number of Subjects Normal	Total
0 - 2	13	10	23
3 - 8	7	10	17
Total	20	20	40

Chi square = .41, $p > .05$

TABLE 6.--Chi-square test (corrected for continuity) of gifted and retarded 11-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Number of Subjects Retarded	Total
0 - 2	13	14	27
3 - 8	7	10	17
Total	20	24	44

Chi square = .02, $p > .05$

old subjects produce as many human movement responses on the Kinget as do gifted 11-year-old subjects. Tables 64 and 65 in the Appendix show the number of human movement responses by gifted and retarded 11-year-old subjects. Table 6 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded 11-year-old subjects produce as many human movement responses on the Kinget as do gifted 11-year-old subjects is accepted.

In Hypothesis 7 it is stated that normal 9-year-old subjects produce as many human movement responses on the Kinget as do gifted 9-year-old subjects. Tables 66 and 67 in the Appendix show the number of human movement responses by gifted and normal 9-year-old subjects. Table 7 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that normal 9-year-old subjects produce as many human movement responses on the Kinget as do gifted 9-year-old subjects is accepted.

In Hypothesis 8 it is stated that retarded 9-year-old subjects produce as many human movement responses on the Kinget as do gifted 9-year-old subjects. Tables 66 and 67 in the Appendix show the number of human movement responses by gifted and retarded 9-year-old subjects. Table 8 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded 9-year-old subjects produce as many human movement responses on the

TABLE 7.--Chi-square test (corrected for continuity) of gifted and normal 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Normal	Total
0 - 2	11	9	20
3 - 8	9	14	23
Total	20	23	43

Chi square = .53, $p > .05$

TABLE 8.--Chi-square test (corrected for continuity) of gifted and retarded 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Retarded	Total
0 - 2	11	19	30
3 - 8	9	3	12
Total	20	22	42

Chi square = 3.64, $p > .05$

Kinget as do gifted 9-year-old subjects is accepted.

In Hypothesis 9 it is stated that normal subjects produce as many human movement responses on the Kinget as do gifted subjects. Tables 60 through 67 in the Appendix show the number of human movement responses by gifted and normal subjects. Table 9 shows a chi-square value is not statistically significant. Therefore, the null hypothesis that normal subjects produce as many human movement responses on the Kinget as do gifted subjects is accepted.

In Hypothesis 10 it is stated that retarded subjects produce as many human movement responses on the Kinget as do gifted subjects. Tables 60 through 67 in the Appendix show the number of human movement responses by gifted and retarded subjects. Table 10 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded subjects produce as many human movement responses on the Kinget as do gifted subjects is accepted.

In Hypothesis 11 it is stated that retarded 15-year-old subjects produce as many human movement responses on the Kinget as do normal 15-year-old subjects. Tables 60 and 61 in the Appendix show the number of human movement responses by normal and retarded 15-year-old subjects. Table 11 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded 15-year-old subjects produce as many human movement responses

TABLE 9.--Chi-square test of gifted and normal subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Normal	Total
0 - 2	47	47	94
3 - 8	34	41	75
Total	81	88	169

Chi square = .36, $p > .05$

TABLE 10.--Chi-square test of gifted and retarded subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Retarded	Total
0 - 2	47	62	109
3 - 8	34	25	59
Total	81	87	168

Chi square = 3.23, $p > .05$

TABLE 11.--Chi-square test (corrected for continuity) of normal and retarded 15-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects: Normal	Retarded	Total
0 - 2	14	14	28
3 - 8	10	7	17
Total	24	21	45

Chi square = .06, $p > .05$

TABLE 12.--Chi-square test (corrected for continuity) of normal and retarded 13-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects: Normal	Retarded	Total
0 - 2	14	15	29
3 - 8	7	5	12
Total	21	20	41

Chi square = .05, $p > .05$

on the Kinget as do normal 15-year-old subjects is accepted.

In Hypothesis 12 it is stated that retarded 13-year-old subjects produce as many human movement responses on the Kinget as do normal 13-year-old subjects. Tables 62 and 63 in the Appendix show the number of human movement responses by normal and retarded 13-year-old subjects. Table 12 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded 13-year-old subjects produce as many human movement responses on the Kinget as do normal 13-year-old subjects is accepted.

In Hypothesis 13 it is stated that retarded 11-year-old subjects produce as many human movement responses on the Kinget as do normal 11-year-old subjects. Tables 64 and 65 in the Appendix show the number of human movement responses by normal and retarded 11-year-old subjects. Table 13 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that retarded 11-year-old subjects produce as many human movement responses on the Kinget as do normal 11-year-old subjects is accepted.

In Hypothesis 14 it is stated that retarded 9-year-old subjects produce as many human movement responses on the Kinget as do normal 9-year-old subjects. Tables 66 and 67 in the Appendix show the number of human movement responses by normal and retarded 9-year-old subjects. Table 14 shows a chi-square value which is statistically significant. Therefore, the null hypothesis that retarded 9-year-

TABLE 13.--Chi-square test (corrected for continuity) of normal and retarded 11-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Normal	Retarded	Total
0 - 2	10	14	24
3 - 8	10	10	20
Total	20	24	44

Chi square = .16, $p > .05$

TABLE 14.--Chi-square test (corrected for continuity) of normal and retarded 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Normal	Retarded	Total
0 - 2	9	19	28
3 - 8	14	3	17
Total	23	22	45

Chi square = 8.71, $p < .01$

old subjects produce as many human movement responses on the Kinget as do normal 9-year-old subjects is rejected.

In Hypothesis 15 it is stated that retarded subjects produce as many human movement responses on the Kinget as do normal subjects. Tables 60 through 67 in the Appendix show the number of human movement responses by normal and retarded subjects. Table 15 shows a chi-square value which is statistically significant. Therefore, the null hypothesis that retarded subjects produce as many human movement responses on the Kinget as do normal subjects is rejected.

In Hypothesis 16 it is stated that 13-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects. Tables 60 through 63 in the Appendix show the number of human movement responses by 15-year-old and 13-year-old subjects. Table 16 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 13-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects is accepted.

In Hypothesis 17 it is stated that 11-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects. Tables 60, 61, 64, and 65 in the Appendix show the number of human movement responses by 15-year-old and 11-year-old subjects. Table 17 shows a chi-square value which is not statistically significant.

TABLE 15.--Chi-square test of normal and retarded subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Normal	Number of Subjects Retarded	Total
0 - 2	47	62	109
3 - 8	41	25	66
Total	88	87	175

Chi square = 5.94, $p < .05$

TABLE 16.--Chi-square test of 15-year-old and 13-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects 15-year-olds	Number of Subjects 13-year-olds	Total
0 - 2	42	38	80
3 - 8	24	23	47
Total	66	61	127

Chi square = .02, $p > .05$

TABLE 17.--Chi-square test of 15-year-old and 11-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects 15-year-olds	11-year-olds	Total
0 - 2	42	37	79
3 - 8	24	27	51
Total	66	64	130

Chi square = .46, $p > .05$

TABLE 18.--Chi-square test of 15-year-old and 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects 15-year-olds	9-year-olds	Total
0 - 2	42	39	81
3 - 8	24	26	50
Total	66	65	131

Chi square = 1.83, $p > .05$

Therefore, the null hypothesis that 11-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects is accepted.

In Hypothesis 18 it is stated that 9-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects. Tables 60, 61, 66, and 67 in the Appendix show the number of human movement responses by 15-year-old and 9-year-old subjects. Table 18 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 9-year-old subjects produce as many human movement responses on the Kinget as do 15-year-old subjects is accepted.

In Hypothesis 19 it is stated that younger subjects produce as many human movement responses on the Kinget as do 15-year-old subjects. Tables 60 through 67 in the Appendix show the number of human movement responses by 15-year-old and younger subjects. Table 19 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that younger subjects produce as many human movement responses on the Kinget as do 15-year-old subjects is accepted.

In Hypothesis 20 it is stated that 11-year-old subjects produce as many human movement responses on the Kinget as do 13-year-old subjects. Tables 62 through 65 in the Appendix show the number of human movement responses by 13-year-old and 11-year-old subjects. Table 20 shows a

TABLE 19.--Chi-square test of 15-year-old subjects and younger subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Age 15	Ages 13, 11, 9	Total
0 - 2	42	114	156
3 - 8	24	76	100
Total	66	190	256

Chi square = .27, $p > .05$

TABLE 20.--Chi-square test of 13-year-old and 11-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects 13-year-olds	11-year-olds	Total
0 - 2	38	37	75
3 - 8	23	27	50
Total	61	64	125

Chi square = .73, $p > .05$

chi-square value which is not statistically significant. Therefore, the null hypothesis that 11-year-old subjects produce as many human movement responses on the Kinget as do 13-year-old subjects is accepted.

In Hypothesis 21 it is stated that 9-year-old subjects produce as many human movement responses on the Kinget as do 13-year-old subjects. Tables 62, 63, 66, and 67 in the Appendix show the number of human movement responses by 13-year-old and 9-year-old subjects. Table 21 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 9-year-old subjects produce as many human movement responses on the Kinget as do 13-year-old subjects is accepted.

In Hypothesis 22 it is stated that younger subjects produce as many human movement responses on the Kinget as do 13-year-old subjects. Tables 62 through 67 in the Appendix show the number of human movement responses by 13-year-old subjects and younger subjects. Table 22 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that younger subjects produce as many human movement responses on the Kinget as do 13-year-old subjects is accepted.

In Hypothesis 23 it is stated that 9-year-old subjects produce as many human movement responses on the Kinget as do 11-year-old subjects. Tables 64 through 67 in the Appendix show the number of human movement responses by 11-year-old and 9-year-old subjects. Table 23 shows a

TABLE 21.--Chi-square test of 13-year-old and 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects 13-year-olds	9-year-olds	Total
0 - 2	38	39	77
3 - 8	23	26	49
Total	61	65	126

Chi square = .07, $p > .05$

TABLE 22.--Chi-square test of 13-year-old subjects and younger subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Age 13	Ages 11 & 9	Total
0 - 2	38	76	114
3 - 8	23	53	76
Total	61	129	190

Chi square = .20, $p > .05$

TABLE 23.--Chi-square test of 11-year-old and 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects 11-year-olds	9-year-olds	Total
0 - 2	37	39	76
3 - 8	27	26	53
Total	64	65	129

Chi square = .64, $p > .05$

TABLE 24.--Chi-square test (corrected for continuity) of 15-year-old non-reversers and reversers for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Non-reversers	Reversers	Total
0 - 2	37	5	42
3 - 8	21	3	24
Total	58	8	66

Chi square = .10, $p > .05$

chi-square value which is not statistically significant. Therefore, the null hypothesis that 9-year-old subjects produce as many human movement responses on the Kinget as do 11-year-old subjects is accepted.

In Hypothesis 24 it is stated that 15-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 15-year-old subjects who are non-reversers. Tables 60 and 61 in the Appendix show the number of human movement responses by 15-year-old non-reversers and reversers. Table 24 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 15-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 15-year-old subjects who are non-reversers is accepted.

In Hypothesis 25 it is stated that 13-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 13-year-old subjects who are non-reversers. Tables 62 and 63 in the Appendix show the number of human movement responses by 13-year-old non-reversers and reversers. Table 25 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 13-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 13-year-old subjects who are non-reversers is accepted.

In Hypothesis 26 it is stated that 11-year-old subjects who are reversers produce as many human movement

TABLE 25.--Chi-square test (corrected for continuity) of 13-year-old non-reversers and reversers for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects		
	Non-reversers	Reversers	Total
0 - 2	32	6	38
3 - 8	19	4	23
Total	51	10	61

Chi square = .04, $p > .05$

TABLE 26.--Chi-square test (corrected for continuity) of 11-year-old non-reversers and reversers for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects		
	Non-reversers	Reversers	Total
0 - 2	34	3	37
3 - 8	21	6	27
Total	55	9	64

Chi square = 1.11, $p > .05$

responses on the Kinget as do 11-year-old subjects who are non-reversers. Tables 64 and 65 in the Appendix show the number of human movement responses by 11-year-old non-reversers and reversers. Table 26 shows a chi-square value is not statistically significant. Therefore, the null hypothesis that 11-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 11-year-old subjects who are non-reversers is accepted.

In Hypothesis 27 it is stated that 9-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 9-year-old subjects who are non-reversers. Tables 66 and 67 in the Appendix show the number of human movement responses by 9-year-old non-reversers and reversers. Table 27 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 9-year-old subjects who are reversers produce as many human movement responses on the Kinget as do 9-year-old subjects who are non-reversers is accepted.

In Hypothesis 28 it is stated that reversers produce as many human movement responses on the Kinget as do non-reversers. Tables 60 through 67 in the Appendix show the number of human movement responses by non-reversers and reversers. Table 28 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that reversers produce as many human movement responses on the Kinget as do non-reversers is accepted.

TABLE 27.--Chi-square test (corrected for continuity) of 9-year-old non-reversers and reversers for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Non-reversers	Reversers	Total
0 - 2	33	6	39
3 - 8	22	4	26
Total	55	10	65

Chi square = .13, $p > .05$

TABLE 28.--Chi-square test of non-reversers and reversers for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Non-reversers	Reversers	Total
0 - 2	136	20	156
3 - 8	83	17	100
Total	219	37	256

Chi square = .86, $p > .05$

In Hypothesis 29 it is stated that 15-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 15-year-old immobilized subjects. Tables 60 and 61 in the Appendix show the number of human movement responses by immobilized and non-immobilized 15-year-old subjects. Table 29 shows a chi-square value is not statistically significant. Therefore, the null hypothesis that 15-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 15-year-old immobilized subjects is accepted.

In Hypothesis 30 it is stated that 13-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 13-year-old immobilized subjects. Tables 62 and 63 in the Appendix show the number of human movement responses by immobilized and non-immobilized 13-year-old subjects. Table 30 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 13-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 13-year-old immobilized subjects is accepted.

In Hypothesis 31 it is stated that 11-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 11-year-old immobilized subjects. Tables 64 and 65 in the Appendix show the number of human movement responses by immobilized and non-immobilized 11-year-old subjects. Table 31 shows a chi-square value which is not

TABLE 29.--Chi-square test of 15-year-old immobilized and non-immobilized subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Immobilized	Non-immobilized	Total
0 - 2	20	22	42
3 - 8	10	14	24
Total	30	36	66

Chi square = .22, $p > .05$

TABLE 30.--Chi-square test of 13-year-old immobilized and non-immobilized subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Immobilized	Non-immobilized	Total
0 - 2	17	21	38
3 - 8	13	10	23
Total	30	31	61

Chi square = .80, $p > .05$

TABLE 31.--Chi-square test of 11-year-old immobilized and non-immobilized subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Immobilized	Non-immobilized	Total
0 - 2	17	20	37
3 - 8	13	14	27
Total	30	34	64

Chi square = .03, $p > .05$

TABLE 32.--Chi-square test of 9-year-old immobilized and non-immobilized subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Immobilized	Non-immobilized	Total
0 - 2	21	18	39
3 - 8	10	16	26
Total	31	34	65

Chi square = 1.48, $p > .05$

statistically significant. Therefore, the null hypothesis that 11-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 11-year-old immobilized subjects is accepted.

In Hypothesis 32 it is stated that 9-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 9-year-old immobilized subjects. Tables 66 and 67 in the Appendix show the number of human movement responses by immobilized and non-immobilized 9-year-old subjects. Table 32 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that 9-year-old non-immobilized subjects produce as many human movement responses on the Kinget as do 9-year-old immobilized subjects is accepted.

In Hypothesis 33 it is stated that non-immobilized subjects produce as many human movement responses on the Kinget as do immobilized subjects. Tables 60, 62, 64, and 66 in the Appendix show the number of human movement responses by immobilized subjects, and Tables 61, 63, 65, and 67 show the number of human movement responses by non-immobilized subjects. Table 33 shows a chi-square value which is not statistically significant. Therefore, the null hypothesis that non-immobilized subjects produce as many movement responses on the Kinget as do immobilized subjects is accepted.

An examination of all these results reveals that

TABLE 33.--Chi-square test of immobilized and non-immobilized subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Immobilized	Non-immobilized	Total
0 - 2	75	81	156
3 - 8	46	54	100
Total	121	135	256

Chi square = .11, $p > .05$

TABLE 34.--Chi-square test (corrected for continuity) of 15-year-old male and female reversers and non-reversers

	Number of Subjects Boys	Girls	Total
Reversers	7	1	8
Non-reversers	27	31	58
Total	34	32	66

Chi square = 3.22, $p > .05$

older subjects do not produce more human movement responses on the Kinget than do younger subjects. Comparisons among gifted, normal, and retarded subjects reveal that at ages 15, 13, and 11, there is no statistically significant difference in the production of human movement responses. At age 9 normal subjects produce significantly more human movement responses than do retarded subjects.

Tables 11, 12, and 13 reveal that at ages 15, 13 and 11, there is no statistically significant difference between human movement responses of normal and retarded subjects (chi-square = .06, .05, and .16). Thus, the result revealed in Table 14 that normal 9-year-old subjects produce more of such responses than do retarded subjects (chi-square = 8.71) accounts in large measure for rejection of null Hypothesis 15 that retarded subjects produce as many human movement responses on the Kinget as do normal subjects.

Therefore, it must be concluded that only at age 9 do normal subjects produce significantly more human movement responses on the Kinget than do retarded subjects. Table 7 reveals that there is no significant difference in production of human movement responses between gifted and normal subjects at age 9. Therefore, the general hypothesis that production of human movement responses on the Kinget is not a developmental process is accepted.

Since null Hypotheses 24 through 28 comparing non-reversers to reversers in the production of human movement responses were accepted, and since null Hypotheses 29 through 33 comparing immobilized subjects to non-immobilized subjects were accepted, the general hypotheses that reversers and non-immobilized subjects produce as many human movement responses on the Kinget as do non-reversers and immobilized subjects is accepted.

Two unanticipated findings were these:

1. Significantly more boys than girls were reversers.

2. At age 9, significantly more girls than boys produced human movement responses on the Kinget. At other ages, no significant difference was found.

In the comparisons of boys to girls in reversal of the reversed N in the Digit Symbol Test, Tables 34, 35, 36, and 37 reveal that at ages 15, 13, 11, and 9, there were no statistically significant differences (chi-square values = 3.22, 3.29, .001, and 1.68, respectively). Table 38 reveals that among gifted subjects there was no statistically significant difference (chi-square value = 1.53). Table 39 reveals that among normal subjects, significantly more boys than girls were reversers (chi-square = 4.55). Table 40 reveals that among retarded subjects, there was no statistically significant difference (chi-square = .04). However, Table 41 shows that a comparison of boys to girls at all age levels and at all IQ ranges reveals that more boys

TABLE 35.--Chi-square test (corrected for continuity) of 13-year-old male and female reversers and non-reversers

	Number of Subjects		
	Boys	Girls	Total
Reversers	9	2	11
Non-reversers	23	27	50
Total	32	29	61

Chi square = 3.29, $p > .05$

TABLE 36.--Chi-square test (corrected for continuity) of 11-year-old male and female reversers and non-reversers

	Number of Subjects		
	Boys	Girls	Total
Reversers	4	5	9
Non-reversers	29	26	55
Total	33	31	64

Chi square = .001, $p > .05$

TABLE 37.--Chi-square test (corrected for continuity) of 9-year-old male and female reversers and non-reversers

	Number of Subjects		
	Boys	Girls	Total
Reversers	7	3	10
Non-reversers	23	32	55
Total	30	35	65

Chi square = 1.68, $p > .05$

TABLE 38.--Chi-square test (corrected for continuity) of gifted male and female reversers and non-reversers

	Number of Subjects		
	Boys	Girls	Total
Reversers	5	1	6
Non-reversers	36	39	75
Total	41	40	81

Chi-square = 1.53, p. $> .05$

TABLE 39.--Chi-square test (corrected for continuity) of normal male and female reversers and non-reversers

	Number of Subjects		
	Boys	Girls	Total
Reversers	11	3	14
Non-reversers	32	42	74
Total	43	45	88

Chi square = 4.55, $p < .05$

TABLE 40.--Chi-square test (corrected for continuity) of retarded male and female reversers and non-reversers

	Number of Subjects		
	Boys	Girls	Total
Reversers	11	7	18
Non-reversers	34	35	69
Total	45	42	87

Chi square = .04, $p > .05$

TABLE 41.--Chi-square test (corrected for continuity) of male and female reversers and non-reversers

	Number of Subjects		
	Boys	Girls	Total
Reversers	27	11	38
Non-reversers	102	116	218
Total	129	127	256

Chi square = 6.68, $p < .01$

TABLE 42.--Chi-square test of immobilized female and male subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects		
	Girls	Boys	Total
0 - 2	33	42	75
3 - 8	28	18	46
Total	61	60	121

Chi square = 3.24, $p > .05$

than girls were reversers, above the .01 level of significance (chi-square value = 6.68).

In a comparison of boys to girls in the production of human movement responses on the Kinget, Table 42 (immobilized subjects), Table 43 (non-immobilized subjects) and Table 44 (all subjects) reveal no statistically significant difference (chi-square values = 3.24, .32, and 2.69, respectively). Inasmuch as age 9 was the only age level at which statistically significant differences were found in production of human movement responses in comparisons of gifted, normal, and retarded subjects, a number of separate comparisons at age 9 were subjected to the Fisher test and to the chi-square test (corrected for continuity) for significance. Twelve of these tests appear in Tables 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, and 56. Table 45 (immobilized) and Table 46 (non-immobilized) reveal that in these comparisons of male and female 9-year-olds, there was no statistically significant difference (chi-square values = 1.03 and 3.14, respectively). However, Table 47 reveals that 9-year-old girls produce significantly more human movement responses than do 9-year-old boys (chi-square = 5.21).

In this study, innumerable additional comparisons of number of human movement responses were subjected to statistical analysis, comparing boys to girls, immobilized to non-immobilized, and reversers to non-reversers, among gifted, normal, and retarded subjects at each of the age

TABLE 43.--Chi-square test of non-immobilized female and male subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Girls	Boys	Total
0 - 2	38	43	81
3 - 8	28	26	54
Total	66	69	135

Chi square = .32, $p > .05$

TABLE 44.--Chi-square test of female and male subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Girls	Boys	Total
0 - 2	71	85	156
3 - 8	56	44	100
Total	127	129	256

Chi square = 2.69, $p > .05$

TABLE 45.--Chi-square test (corrected for continuity) of immobilized female and male 9-year-olds for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Girls	Boys	Total
0 - 2	9	12	21
3 - 8	7	3	10
Total	16	15	31

Chi square = 1.03, $p > .05$

TABLE 46.--Chi-square test (corrected for continuity) of non-immobilized female and male 9-year-olds for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Girls	Boys	Total
0 - 2	7	11	18
3 - 8	12	4	16
Total	19	15	34

Chi square = 3.14, $p > .05$

TABLE 47.--Chi square test (corrected for continuity) of 9-year-old female and male subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects		
	Girls	Boys	Total
0 - 2	16	23	39
3 - 8	19	7	26
Total	35	30	65

Chi square = 5.21, $p < .05$

TABLE 48.--Fisher Exact Probability test of gifted female and male 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects		
	Girls	Boys	Total
0 - 2	3	8	11
3 - 8	7	2	9
Total	10	10	20

p (obtained probability) $< .05$

levels and among the four age levels. Tables 60 through 67 contain the data from which these comparisons were drawn. Out of all these comparisons, only the 9-year-old subjects consistently showed statistically significant differences in human movement responses.

Table 48 reveals that gifted 9-year-old girls produce significantly more human movement responses than do gifted 9-year-old boys (Fisher test: p (obtained probability) less than .05). Neither Table 49 (normal 9-year-olds) nor Table 50 (retarded 9-year-olds) reveals statistically significant differences between boys and girls in the production of human movement responses.

Table 51 reveals that in a comparison of gifted to normal 9-year-old girls in the production of human movement responses, there was no statistically significant difference. Table 52 reveals that in a comparison of normal to retarded 9-year-old girls in the production of human movement responses, normal girls produced more human movement responses than did retarded girls, above the .01 level of significance. Table 53 reveals that in a comparison of gifted to retarded 9-year-old girls in the production of human movement responses, gifted girls produced significantly more human movement responses than did retarded girls. Tables 54, 55, and 56 reveal that in comparisons among gifted, normal, and retarded 9-year-old boys in the production of human movement responses, no statistically significant differences

TABLE 49.--Fisher Exact Probability test of normal female and male 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Girls	Boys	Total
0 - 2	3	6	9
3 - 8	10	4	14
Total	13	10	23

p (obtained probability) $>$ .05

TABLE 50.--Fisher Exact Probability test of retarded female and male 9-year-old subjects for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Girls	Boys	Total
0 - 2	10	9	19
3 - 8	2	1	3
Total	12	10	22

p (obtained probability) $>$ .05

TABLE 51.--Fisher Exact Probability test of gifted and normal 9-year-old girls for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Normal	Total
0 - 2	3	3	6
3 - 8	7	10	17
Total	10	13	23

p (obtained probability) $> .05$

TABLE 52.--Fisher Exact Probability test of normal and retarded 9-year-old girls for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Normal	Retarded	Total
0 - 2	3	10	13
3 - 8	10	2	12
Total	13	12	25

p (obtained probability) $< .01$

TABLE 53.--Fisher Exact Probability test of gifted and retarded 9-year-old girls for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Retarded	Total
0 - 2	3	10	13
3 - 8	7	2	9
Total	10	12	22

p (obtained probability) $<$ .05

TABLE 54.--Fisher Exact Probability test of gifted and normal 9-year-old boys for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Normal	Total
0 - 2	8	6	14
3 - 8	2	4	6
Total	10	10	20

p (obtained probability $>$ .05

TABLE 55.--Fisher Exact Probability test of normal and retarded 9-year-old boys for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Normal	Retarded	Total
0 - 2	6	9	15
3 - 8	4	1	5
Total	10	10	20

p (obtained probability) $>$ .05

TABLE 56.--Fisher Exact Probability test of gifted and retarded 9-year-old boys for number of human movement responses to the Kinget

Number of Human Movement Responses	Number of Subjects Gifted	Retarded	Total
0 - 2	8	9	17
3 - 8	2	1	3
Total	10	10	20

p (obtained probability) $>$ .05

were revealed.

It must be concluded from these findings that rejection of null Hypothesis 14 that retarded 9-year-old subjects produce as many human movement responses as do normal 9-year-old subjects, and rejection of null Hypothesis 15 that retarded subjects produce as many as do normal subjects, are based largely on the fact that girls at age 9 produce significantly more of such responses than do boys. Furthermore, these findings provide further evidence for acceptance of the general null hypothesis that production of human movement responses on the Kinget is not a developmental process.

CHAPTER V

DISCUSSION

The difficulty of devising tests which measure with some degree of accuracy the developmental process in intellective level has long been recognized. Binet's basic assumption that a person of normal intelligence can do the things persons of his age normally do has been used as the criterion of intellective normality for more than half a century. The intelligence scale originally devised by Binet and Simon, based on this criterion of normality, has inspired extensive research in measures of intellective development. The Stanford-Binet Intelligence Scale, as revised by Terman and Merrill (1960), has achieved the widest recognition and acclaim of any of the myriad tests which attempt to measure intellective growth.

The projective techniques of testing have as their primary objective the exploration of a subject's subconscious, as well as his conscious, reactions to stimuli. They are designed to induce a subject to make a kind of response which is different from that which he makes on a more verbal test, a kind of response which will add to an examiner's insight into the subject's inner self or his self-concept. The problem with which education is most deeply concerned at present is not so much the assessment of how much a student learns, as it is the understanding of how, when, and why he learns.

The process of inhibition has engrossed the attention of a host of researchers: Vold, Freud, Rorschach, Beck, Piotrowski, Watson, Levine, Singer, Meltzoff, Glass, Sprigle, Goldman, Korchin, Spivack, Wight, Herman, Biere, Blacker, Fager, Harlow, and many others. Educators are primarily concerned with the influence of the inhibition process on the learning process. Countless studies have demonstrated that the inhibition process is an influencing factor in a subject's behavior or performance--his functioning--in the learning process and in innumerable life situations. A subject's ability to delay or inhibit an inappropriate response influences his scores on tests of intellective development, of emotional stability, and of scholastic achievement. The results of the present study indicate a need for further research into interrelationships between the process of inhibition and the learning process.

Earlier studies have indicated that subjects of higher intellective level tend to perceive more Humans in Movement (M) on the Rorschach inkblot test than do subjects of lower intellective level. This study of the Kinget

Drawing Completion Test was undertaken to ascertain whether the production of human movement responses on the Kinget is a developmental process. Although there was no assumption made that perceiving M on the Rorschach is a correlate of the production of human movement responses on the Kinget, it has often been theorized that some relationship does exist.

One area of difference between the Rorschach and the Kinget is notable. The Rorschach presents the subject with an inkblot which, in itself, is meaningless, and the subject responds by telling the examiner what he (imaginatively) perceives. The Kinget presents the subject with eight white rectangles containing small curved lines, dots, straight lines and a small black rectangle, and the subject responds by incorporating these stimuli into any drawings he wishes. His verbalizations, then, are in response to his own drawings.

Pepper (1964, p. 31) suggested that scoring the Kinget for human or other movement would be facilitated if the subject were given an opportunity to tell about what he drew. In the present study, the answer sheet (see sample in Appendix) was devised to induce the subjects to "tell all about" their drawings. Scoring human movement from the subjects' verbalizations, as well as from their drawings, and following procedures established by Piotrowski (1957) for scoring human movement on the Rorschach, resulted in lowering the threshold for responses which were scored as human movement.

This study of retarded, normal, and gifted subjects at ages 9, 11, 13, and 15 gives evidence that the production of human movement responses on the Kinget is not a developmental process. In view of this evidence, further analysis was required of the findings that although older subjects did not produce significantly more human movement responses on the Kinget than did younger subjects, and that no gifted subjects at any age produced significantly more human movement responses than did normal or retarded subjects, normal 9-year-old subjects and normal subjects produced significantly more than did retarded subjects. An approximately equal number of boys and girls had been tested at each age and IQ range. A statistical analysis of the responses of boys at age 9 revealed that normal boys did not produce significantly more human movement responses than did retarded boys. An analysis of the responses of girls revealed that normal girls did produce significantly more human movement responses than did retarded girls. No statistically significant difference was found, however, between retarded boys and retarded girls in number of human movement responses. Numerous comparisons were made between boys and girls in number of human movement responses, but no other statistically significant differences were found. The fact that, even among normal and gifted girls at age 9, no statistically significant difference was found in production of human movement responses provides further evidence for acceptance of the general hypothesis that the production of human movement responses on the Kinget is not a measure of intellective development.

Since it was found that at age 9, significantly more girls than boys produced human movement responses, it may be speculated that boys at age 9--more than girls--are fearful of humans in activity: that boys feel safer not to have anybody doing anything. It may also be speculated that the traditional assumption that girls are more interested in people and in social relationships, whereas boys are more interested in things and in abstractions, accounts for the statistically significant difference between boys and girls in production of human movement responses at age 9. It may be further speculated that such a difference might be found to be significant at younger ages, and that this difference tends to dwindle through age 15, perhaps reappearing with significance among older subjects. In view of the study made by Franklin (1963) in which she found that among fifth-grade subjects, poor inhibitors made fewer human movement responses than did good inhibitors, it appears likely that girls at about ages 9 and 10--and possibly younger--are better inhibitors than are boys.

Earlier studies (Rorschach, Beck, and Piotrowski on the Rorschach test, and Franklin on the Kinget) have indicated that prior immobilization of subjects resulted in their producing more human movement responses. No statistically significant difference was found in this study between immobilized and non-immobilized subjects in the production of human movement responses. It appears likely, however, that using the answer sheet nullified the influence of the immobilization factor in that, by the time the subjects had completed the drawings, the influence of the prior immobilization had receded to the point that it had no influence on their written answers. Immobilizing the subjects again prior to having them write their answers might have resulted in the production of greater numbers of human movement responses among these subjects.

Franklin (1963) found that at fifth grade, non-reversers produced more human movement responses than did reversers. In the present study, no statistically significant difference was found at any age between non-reversers and reversers in the production of human movement responses. It appears likely that this differential in findings may be accounted for by the difference in procedure involving the use of the answer sheet. If only the drawings had been considered, without consideration of the verbalizations on the answer sheet, it is possible that the reversers might have been found to produce fewer human movement responses.

Consideration of differences between responses of boys and girls led to the discovery that significantly more boys than girls were reversers of the reversed N on the Digit Symbol Test. At ages 15, 13, 11, and 9, no statistically significant difference in number of reversers was found. Among gifted and retarded boys and girls, no statistically significant difference was found. Among normal subjects, significantly more boys than girls were reversers. A comparison between all boys and all girls in the study (129 boys and 127 girls) revealed that significantly more boys than girls were reversers beyond the .01 level of confidence (Table 41). Based on the conclusions of Levine, Glass, and Meltzoff (1957) and others that subjects who respond inappropriately to the reversed N in the Digit Symbol Test are poor inhibitors, it may be concluded that girls are better inhibitors than are boys.

This conclusion does not exclude the possibility that there may be numerous other explanations of the finding that more boys than girls are reversers. It has long been recognized that on various tests, girls tend to excel in the area of verbalization, in clerical tests which involve seeing similarities and differences in spelling or in word or number reversals, in copying what is presented, such as words, nonsense syllables, numbers, geometrical shapes, and the like. In tests of other abilities, such as those which require mathematics, abstract reasoning, logical conclusions, spatial relationships, and the like, boys tend to excel. In this connection, one possibility cannot be overlooked: The reversed N on the Digit Symbol Test is in itself a "wrong" N. It can be reasoned that the tendency of boys to make a correct N from this stimulus reflects a tendency to be more independent, to respond logically, or perhaps aggressively, with the "correct" N, whereas girls may tend to be more dependent and to respond passively to the given directions, no matter how illogical the stimulus may be. This conclusion would correlate with the traditional assumption that girls tend to be more dependent, more passive, more tractable than do boys.

It might also be reasoned that boys tend, more than do girls, toward a form of dyslexis which results in their inverting or reversing shapes. This possibility might account for the greater difficulty which boys experience in reading and in spelling.

For whatever reason, the finding that significantly more boys than girls were found in this study to be reversers raises more questions than it settles. Every primary teacher is aware of the difficulty of teaching children to differentiate b and d, p and q, n and u, 6 and 9, saw and was. Until children can make these distinctions readily, they experience difficulty in reading and in spelling. It has long been established that boys have greater difficulty than do girls in these two areas of learning, and that girls, even though they show no evidence of having superior intelligence, tend to make better marks in school than do boys, a fact which has deeply concerned educators and psychologists.

Cartwright (Koch, 1959) discusses a number of studies of level of aspiration and concludes (p. 43): ". . . an experience of success tends to raise the level of aspiration for future performance, and failure tends to lower it." It can be reasoned that a situation in which boys fail to achieve equal success with girls in school marks would tend to lower the boys' level of aspiration.

A number of solutions have been proposed, such as later enrollment for boys than for girls, segregation of boys and girls in classrooms, or early identification and special training for students suffering from some degree of dyslexis. Much worthwhile experimental research needs to be done in the area of differences in the influence of the inhibition process on boys and on girls, particularly as it relates to the learning process, and in differences between boys and girls in reversal tendencies.

CHAPTER VI

SUMMARY

This experiment was designed to ascertain (1) whether the production of human movement responses on the Kinget Drawing Completion Test is a developmental process, (2) whether at ages 15, 13, 11, and 9, inhibiting motoric activity prior to administration of the Kinget would result in production of more of such responses, and (3) whether, at ages 15, 13, 11, and 9, non-reversers (subjects who inhibit the inappropriate response to the reversed N on the Digit Symbol Test of the Wechsler-Bellevue Intelligence Scale, Form I) produce more of such responses than do reversers.

Analysis of the data obtained in the study pointed to a need for investigating further (1) whether more girls than boys produce human movement responses on the Kinget, and (2) whether more boys than girls are reversers of the reversed N.

No previous studies have been published reporting investigation of these relationships. Previous studies have indicated (1) that subjects of higher intellective level tend to produce more Humans in Movement (M) on the

Rorschach, (2) that fifth-grade subjects who have been immobilized prior to administration of the Kinget produce more human movement on the Kinget than do non-immobilized subjects, and (3) that non-reversers at fifth grade produce more human movement on the Kinget than do reversers.

In the present study, subjects in the experimental group were asked to lay their heads on their desks and remain quiet for five minutes before starting the drawings on the Kinget. After each subject completed his drawings he was given an answer sheet and was asked to tell all about his drawings. Wherever necessary, the answers were written as the subject dictated them.

In accordance with Piotrowski's procedures for scoring M on the Rorschach, a response was counted as human movement if the drawing or the subject's discussion of it indicated human movement or human emotional involvement. A subject was considered a reverser if he reversed one or more of the ten reversed N's on the Digit Symbol Test.

Subjects were selected from the public schools in Long Beach, California. There were 256 students at ages 15, 13, 11, and 9, who had been previously identified as gifted, normal, or retarded. Approximately equal numbers were selected in each of the twelve categories; and in each category, approximately equal numbers of boys and girls were selected. In the same way, the experimental group (immobilized) was matched to the control group (non-immobilized). Tests were administered to groups of three to twenty subjects at one time, depending on age and IQ level, in the school cafeteria or in a large room. The subjects were seated far enough apart that they could not see each other's drawings.

This study resulted in the following findings:

1. Production of human movement responses on the Kinget is not a developmental process. Gifted subjects do not produce significantly more of such responses than do normal subjects. Normal subjects produce significantly more of such responses than do retarded subjects. However, at ages 15, 13, and 11, normal subjects do not produce significantly more of such responses than do retarded subjects. At age 9, normal subjects produce significantly more than do retarded subjects. Normal boys at age 9, however, produce significantly no more of such responses than do retarded boys, yet normal girls at age 9 produce significantly more of such responses than do retarded girls at that age. At ages 15, 13, 11, and 9, older subjects do not produce significantly more of such responses than do younger subjects.

2. The inhibition factors introduced here have no apparent influence on the production of human movement responses on the Kinget. Following the procedures in this study, immobilized subjects do not produce significantly more human movement responses on the Kinget than do

non-immobilized subjects. At ages 15, 13, 11, and 9, non-reversers do not produce significantly more of such responses than do reversers.

3. Two incidental findings were these: Significantly more boys than girls are reversers of the reversed N in the Digit Symbol Test. Girls at age 9 produce significantly more human movement responses on the Kinget than do boys at that age.

From these findings, it is concluded that the production of human movement responses on the Kinget cannot be used as a measure of intellective development above the chronological age of 9. Whether it can be used as such a measure at younger ages was not considered in this study. It is concluded further that the production of human movement responses on the Kinget, as elicited by the procedures in this study, cannot be used as a measure of the inhibition process.

In earlier studies, the inhibition process has been demonstrated to influence the learning process, as exhibited by performance or behavior of subjects, and that a subject's tendency to reverse the reversed N on the Digit Symbol Test is evidence that he tends to be a poor inhibitor (unable to inhibit the inappropriate response). Numerous studies have shown that a subject's ability to delay or inhibit an inappropriate response enables him to achieve better scores on tests. Since the findings in this study indicate that girls are better inhibitors than are boys of the inappropriate response to the reversed N, it may be concluded that girls are better inhibitors than are boys in other areas, and that this difference in the inhibition process accounts in part for the fact that girls achieve better marks in school than do boys, by delaying or inhibiting inappropriate responses to questions.

The possibility of two quite different conclusions, however, cannot be overlooked. Every primary school teacher regularly encounters the difficulty of teaching some children to distinguish between reversed letters and words, such as b and d or saw and was. It may be concluded that since the findings in the present study indicate that boys reverse the N more than do girls, this reversal tendency accounts in part for the fact that boys tend to have difficulty in learning to read and to spell as readily as do girls, and that special consideration should be given to helping boys particularly to overcome reversal tendencies.

Another quite different conclusion is worth considering. Since a reversed N is patently illogical, it may very well be concluded that boys, being more independent, are more prone than girls to respond with the "logical" N, whereas girls, being more dependent and more prone to follow directions, logical or not, respond with the reversed N as presented.

Certainly, it must be concluded that the reversed

N should be excluded from an intelligence test unless a compensating item favoring boys is included in the same portion of the test. In this connection, it is worth noting that other forms of the Wechsler intelligence scales have omitted the reversed N from the Digit Symbol Test.

It is recommended that differences between boys and girls in the influence of the inhibition process and in reversal tendencies be subjected to further experimental studies.

BIBLIOGRAPHY

American Psychological Association. Publication Manual of the American Psychological Association. 1957 Revision. Washington, D. C.: American Psychological Association, Inc., 1957.

Ames, Louise Bates, et al. Rorschach Responses in Old Age. New York: Medical Book Department of Harper & Brothers, 1954.

Anderson, Harold H., and Anderson, Gladys L. (eds.) An Introduction to Projective Techniques. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1951.

Anderson, Rose G. Technical Manual: Kuhlmann-Anderson Test. 7th ed. Princeton: Personnel Press, Inc., 1963.

Aron, Betty. A Manual for Analysis of The Thematic Apperception Test. Berkeley: Willis E. Berg, 1949.

Bailey, Robert Bain. "A Study of Predicting Academic Success in Elementary School Reading from Projective Tests." Unpublished Ed.D. dissertation, University of Oklahoma, 1956.

Beck, Samuel J. Rorschach's Test. Vol. I: Basic Processes. New York: Grune & Stratton, 1944.

____________. Rorschach's Test. Vol. II: A Variety of Personality Pictures. New York: Grune & Stratton, 1945.

____________. Rorschach's Test. Vol. III: Advances in Interpretation. New York: Grune & Stratton, 1952.

____________. Rorschach's Test. Vol. I: Basic Processes. 3rd ed. New York: Grune & Stratton, 1961.

Bellak, Leopold. The Thematic Apperception Test and the Children's Apperception Test in Clinical Use. New York, 1954.

Berdie, R. F. "Measurement of Adult Intelligence by Drawings," Journal of Clinical Psychology, I (1945), pp. 288-295.

Biere, J. and Blacker, E. "External and Internal Stimulus Factors in Rorschach Performance," Journal of Consulting Psychology, XX, (1956), pp. 1-7.

Brown, Judson S. The Motivation of Behavior. New York: McGraw-Hill Book Co., Inc., 1961.

Cochran, W. G. "Some Methods for Strengthening the Common Chi-square Tests." Biometrics, XX (1954), pp. 417-451.

Cornell, Ethel L., and Coxe, Warren W. A Performance Ability Scale: Examination Manual. Yonkers-on-Hudson, N. Y.: World Book Company, 1934.

Cronbach, Lee J. Essentials of Psychological Testing. 2nd ed. New York: Harper & Brothers, 1960.

Fager, R. E. "Relation of Rorschach movement and color responses to cognitive inhibition," Journal of Consulting Psychology, XXIV (1960), p. 276.

Fisher, Sir Ronald A., and Yates, Frank. Statistical Tables for Biological, Agricultural, and Medical Research, 6th edition. New York: Hafner Publishing Co., 1963.

Franklin, Julia Lavinia. "The Inhibition Process and the Handling of Humans and Humans in Movement on the Kinget." Unpublished Ph.D. dissertation, University of Oklahoma, 1963.

Garrett, Henry E. General Psychology. New York: American Book Company, 1961.

Guertin, W. H., and Sloan, W. "A Comparison of the House Tree Person and Wechsler-Bellevue IQ's in Mental Defectives," Journal of Clinical Psychology, IV (1948), pp. 425-426.

Guilford, J. P. Fundamental Statistics in Psychology and Education, New York: McGraw-Hill Book Company, Inc., 1956.

Gunther, M. K., and Havighurst, R. J. "Environment and the Draw-A-Man Test," Journal of Abnormal and Social Psychology, XXI (1946), pp. 50-63.

Harris, Dean Vernon. "The Effects of Inhibition and Tension on Fantasy." Unpublished Ph.D. dissertation, University of Oklahoma, 1963.

Henry, William E. The Analysis of Fantasy: The Thematic Apperception Technique in the Study of Personality. New York: John Wiley & Sons, Inc., 1956.

Harlow, Harry F. "Learning set and error factor theory," in Psychology: A Study of a Science, Vol. 2, Sigmund Koch, editor. New York: McGraw-Hill Book Company, Inc., 1959, pp. 492-537.

Jamison, Patricia McMillan. "The Kinget Drawing-Completion Test: Comparison of Responses for Full-Blood Navajo and White Children in Grades Three and Six." Unpublished Master's thesis, University of Oklahoma, 1959.

Kinget, G. Marian. The Drawing-Completion Test: A Projective Technique for the Investigation of Personality. New York: Grune & Stratton, Inc., 1952.

Koch, Sigmund. Psychology: A Study of a Science. Vol. II: General Systematic Formulations, Learning, and Special Processes. New York: McGraw-Hill Book Co., Inc. 1959.

Krech, David and Crutchfield, Richard S. Elements of Psychology. New York: Alfred A. Knopf, Inc., 1958.

Laird, Albert Walter. "Differential Analysis of Creativity and Imagination between Gifted and Non-Gifted High School Students as Ascertained by the Kinget Drawing-Completion Test." Unpublished Ph.D. dissertation, University of Oklahoma, 1964.

Lamke, Tom A., and Nelson, M. J. The Henmon-Nelson Tests of Mental Ability: Examiner's Manual. Boston: Houghton Mifflin Company, 1960.

Levine, M., Glass, H., and Meltzoff, J. "The inhibition process, Rorschach human movement response, and intelligence: some further data," Journal of Consulting Psychology, XXI (1957), pp. 41-45.

Lorge, Irving, Thorndike, Robert L. and Hagen, Elizabeth. Lorge-Thorndike Intelligence Tests: Kindergarten-Grades 12/13. Boston: Houghton Mifflin Company, 1964.

Mahoney, Stanley Chellis. "The Effect of Shape of Background upon Preference for Rectangles." Unpublished Master's thesis, University of Oklahoma, 1954.

Macfarlane, J. W., and Tuddenham, R. D. "Problems in the validation of projective techniques." In Anderson, H. H. and G. L. (Eds.) An Introduction to Projective Techniques. Englewood Cliffs, N. J.: Prentice-Hall Inc., 1951.

Meltzoff, J., and Levine, M. "The relationship between motor and cognitive inhibition," Journal of Consulting Psychology, XVIII (1954), pp. 355-358.

Murfett, Betty J. "The Inhibition Process and the Handling of Humans and Humans in Movement." Unpublished Ph.D. dissertation, University of Oklahoma, 1962.

Pepper, Sidney Allan. "Imaginal Processes Following Immobilization." Unpublished Master's thesis, University of Oklahoma, 1964.

Piotrowski, Zygmunt A. Perceptanalysis: A Fundamentally Reworked, Expanded, and Systematized Rorschach Method. New York: The MacMillan Company, 1957.

Prothro, E. Terry, and Teska, P. T. Psychology: A Biosocial Study of Behavior. Boston: Ginn and Company, 1950.

Rapaport, D., Gill, M., and Schafer, R. Diagnostic Psychological Testing. Vol. II. Chicago: Year Book Publishers, 1945.

Rorschach, Hermann. Psychodiagnostics: A Diagnostic Test Based on Perception. New York: Grune & Stratton, Inc., 1942.

Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Company, 1956.

Simpson, William Harold. "A Study of Some Factors in the Bender Gestalt Reproductions of Normal and Disturbed Children." Unpublished Ph.D. dissertation, University of Oklahoma, 1958.

Singer, J. L., Meltzoff, J., and Goldman, G. D. "Rorschach movement responses following motor inhibition and hyperactivity," Journal of Consulting Psychology, XVI (1952), 16, pp. 359-364.

Singer, J. L. "Delayed gratification and ego development: implications for clinical and experimental research," Journal of Consulting Psychology, 1955.

Spivak, G., Levine, M., and Sprigle, H. "Intelligence test performance and the delay function of the ego," Journal of Consulting Psychology, 1959.

Sluyter, Gary Vincent. "The Kinget Drawing-Completion Test, Reliability and Validity Approaches." Unpublished Master's thesis, University of Oklahoma, 1964.

Swink, Richard Harlen. "Human Content on the Drawing Completion Test, Human Movement on the Rorschach Test, and Affiliation Motivation." Unpublished Master's thesis, University of Oklahoma, 1965.

Thetford, W. N. "Fantasy perceptions in the personality development of normal and deviant children," American Journal of Orthopsychiatry, 1952.

Thompson, Anton. "Warning given about indiscriminate use of results of IQ tests," School Bulletin. Long Beach, California: Long Beach Unified School District, January 14, 1966.

Terman, Lewis M., and Merrill, Maud A. Stanford-Binet Intelligence Scale: Manual for the Third Revision, Form L-M. Boston: Houghton Mifflin Company, 1962.

Underwood, Benton J., Duncan, Carl P., Taylor, Janet A., and Cotton, John W. Elementary Statistics, New York: Appleton-Century-Crofts, Inc., 1954.

Viney, Arthur Wayne. "The Effects of Overtraining on Reversal and Nonreversal Shifts in Fast and Slow Learners." Unpublished Ph.D. dissertation, University of Oklahoma, 1964.

Werner, H. and Wapner, S. "Sensory-tonic field theory of perception," Journal of Personality, XVIII (1949), pp. 88-107.

Wood, Edwin C. "Self-Concept as a Mediating Factor in Social Behavior." Unpublished Ph.D. dissertation, University of Oklahoma, 1959.

Wyche, Barbara Joan. "Comparative Experimental Study of Selected Personality Components on the Guilford-Zimmerman Temperament Survey and the Kinget Drawing Completion Test." Unpublished Master's thesis, University of Oklahoma, 1965.

APPENDIX

TABLE 57.--Summary of subjects

Age	Immob.	Non-immob.	M	F	R's	Non-R's	Total Subjects
			Retarded				
9	11	11	10	12	6	16	22
11	10	14	13	11	5	19	24
13	10	10	11	9	3	17	20
15	10	11	11	10	4	17	21
	41	46	45	42	18	69	87
			Normal				
9	10	13	10	13	3	20	23
11	10	10	10	10	3	17	20
13	10	11	11	10	5	16	21
15	10	14	12	12	3	21	24
	40	48	43	45	14	74	88
			Gifted				
9	10	10	10	10	1	19	20
11	10	10	10	10	1	19	20
13	10	10	10	10	3	17	20
15	10	11	11	10	1	20	21
	40	41	41	40	6	75	81
			Column Totals				
Retarded	41	46	45	42	18	69	
Normal	40	48	43	45	14	74	
Gifted	40	41	41	40	6	75	
	121	135	129	127	38	218	256
			Sex				
Male	60	69			27	102	
Female	61	66			11	116	
	121	135			38	218	256

TABLE 58.--Immobilized subjects; sex, chronological age, IQ scores, and identification of reversers

Retarded				Normal				Gifted			
Sex	CA	IQ	R[1]	Sex	CA	IQ	R	Sex	CA	IQ	R
M	9-3	61B[2]		M	9-4	94B	2	M	9-7	145B	
M	9-5	63B	8	M	9-4	105LT[3]		M	9-10	131B	
M	9-8	75B		M	9-5	103LT		M	9-11	153B	
M	9-10	61B	5	M	9-5	95LT	1	M	9-11	130B	
M	9-11	76B		M	9-8	99LT		M	10-0	138B	
F	8-5	70B		F	9-4	101LT		F	9-8	140B	
F	8-11	69B		F	9-7	105LT		F	9-8	131B	
F	9-3	69B		F	9-8	102LT		F	9-8	145B	
F	9-5	69B	3	F	9-9	102LT		F	9-8	138B	
F	9-10	68B	2	F	9-10	99LT		F	9-11	130B	
F	10-0	65B									
M	11-4	66B		M	11-3	99HN[4]		M	11-4	128HN	
M	11-5	69B		M	11-3	104HN		M	11-4	132HN	
M	11-9	76B		M	11-3	102HN		M	11-6	143C[5]	

TABLE 58--Continued

Retarded				Normal				Gifted			
Sex	CA	IQ	R	Sex	CA	IQ	R	Sex	CA	IQ	R
M	12-1	51+B	1	M	11-5	104HN		M	11-8	135HN	
M	12-1	75W[6]		M	11-9	104HN		M	11-9	130HN	
F	11-2	70B		F	11-7	99HN		F	11-5	163C	
F	11-3	73B		F	11-8	100HN		F	11-8	134C	
F	11-6	72B	1	F	11-8	105HN		F	11-9	135C	
F	11-9	72B		F	11-9	102HN		F	11-9	132C	
F	11-10	66LT		F	11-11	101HN		F	11-10	132HN	
M	13-4	70W		M	13-2	95HN		M	13-3	144HN	
M	13-6	66B		M	13-3	103HN		M	13-4	138C	11
M	13-9	77B		M	13-9	103HN	11	M	13-8	131W	
M	13-10	64W		M	13-10	98HN	5	M	13-8	151C	1
M	14-0	67W	3	M	13-10	102HN		M	13-9	133C	
F	13-5	75B		F	13-4	94HN		F	13-3	140HN	
F	13-7	62B	7	F	13-9	89HN		F	13-4	133HN	

TABLE 58--Continued

Retarded				Normal				Gifted			
Sex	CA	IQ	R	Sex	CA	IQ	R	Sex	CA	IQ	R
F	13-10	70W		F	13-10	100HN		F	13-5	135LT	
F	13-11	67W		F	13-11	99HN		F	13-5	130HN	
F	14-0	70B		F	13-11	103HN		F	13-11	133C	
M	15-11	70B	3	M	15-0	104HN	5	M	15-8	136C	
M	16-2	71W		M	16-2	97HN		M	15-10	143C	
M	16-4	78B	4	M	15-5	102HN		M	15-10	126HN	
M	16-8	64W		M	15-6	105HN		M	16-1	126HN	
M	18-3	67W		M	15-9	102HN		M	16-2	142C	
				F	15-0	101HN					
F	15-7	70W		F	15-0	100HN		F	15-6	146HN	
F	16-4	67W		F	15-6	103HN		F	15-6	122HN	
F	16-4	63W	7	F	15-8	100HN		F	15-8	132C	
F	16-6	68W		F	16-2	102HN		F	16-1	130W	
F	16-10	67W						F	16-1	133C	

TABLE 58--Continued

[1]Under R, the number indicates the number of reversed N's the subject copied incorrectly from the Digit Symbol Test of the Wechsler-Bellevue Intelligence Scale, Form I; that is, the number of errors (reversals) he made when attempting to copy that symbol. If there is no number under R, the subject is a non-reverser.

[2]Stanford-Binet Intelligence Scale.

[3]Lorge-Thorndike Intelligence Test.

[4]Henmon-Nelson Test of Mental Ability.

[5]California Test of Mental Maturity.

[6]Wechsler Intelligence Scale for Children.

TABLE 59.--Non-immobilized subjects; sex, chronological age, IQ scores, and identification of reversers

Retarded				Normal				Gifted			
Sex	CA	IQ	R	Sex	CA	IQ	R	Sex	CA	IQ	R
M	9-6	75B*		M	9-7	99LT*		M	9-6	142B	1
M	9-11	72B	1	M	9-7	104LT		M	9-6	137B	
M	10-0	60W		M	9-7	96LT		M	9-8	136B	
M	10-0	72B		M	9-8	104LT		M	9-10	145B	
M	10-1	71B	8	M	10-1	101LT		M	10-1	134B	
F	9-9	74B		F	9-5	101LT		F	9-6	133B	
F	9-9	58B		F	9-5	97LT		F	9-9	134B	
F	9-11	64B		F	9-6	103LT		F	9-11	135B	
F	10-0	66B		F	9-6	99LT		F	10-0	134B	
F	10-1	56B		F	9-7	97LT		F	10-0	131B	
F	10-2	65B		F	9-8	97LT	11				
				F	9-10	100LT					
				F	9-10	104LT					
M	11-5	76B		M	11-3	103HN		M	11-5	151C*	

TABLE 59--Continued

Retarded				Normal				Gifted			
Sex	CA	IQ	R	Sex	CA	IQ	R	Sex	CA	IQ	R
M	11-5	63B		M	11-5	104HN		M	11-5	137C	
M	11-8	47+B		M	11-7	94HN		M	11-5	130HN	
M	11-9	75B		M	11-8	100HN		M	11-6	142C	
M	12-1	74B		M	11-9	102HN	1	M	11-8	138C	
M	12-3	76B									
M	12-4	62B									
M	12-4	70B	4								
F	11-6	67W*						F	11-4	142C	
F	11-8	56B		F	11-8	104HN		F	11-4	147C	1
F	11-9	62B		F	11-8	97HN		F	11-8	133C	
F	12-0	73W	8	F	11-8	104HN		F	11-8	157C	
F	12-1	54W		F	11-10	103HN		F	11-10	135C	
F	12-4	53C	1	F	11-10	98HN	2				
M	13-3	72B		M	13-2	95HN	1	M	13-4	131HN	
M	13-3	76W									

TABLE 59--<u>Continued</u>

Retarded				Normal				Gifted			
Sex	CA	IQ	R	Sex	CA	IQ	R	Sex	CA	IQ	R
M	13-4	77B		M	13-4	94HN		M	13-5	134HN	
M	13-4	75B		M	13-7	105HN	10	M	13-6	135C	3
M	13-5	75W	1	M	13-8	96HN		M	13-9	145C	
M	13-8	75W		M	13-11	105HN		M	14-0	148C	
				M	14-0	98HN					
F	13-1	53C		F	13-5	101HN		F	13-3	140C	
F	13-5	77W		F	13-7	100HN		F	13-6	140HN	
F	13-6	75W		F	13-9	98HN	10	F	13-7	143LT	
F	13-7	59B		F	14-0	99HN		F	13-11	132HN	
				F	14-0	94HN		F	14-0	131HN	
M	15-2	63B	7	M	15-4	104HN		M	15-0	136C	1
M	15-4	73W		M	15-6	104HN		M	15-5	145B	
M	15-4	73W		M	15-8	98HN	2	M	15-6	143B	
M	15-7	75B		M	15-8	105HN	2	M	15-8	142C	
M	15-8	74W		M	15-9	104HN	6	M	15-9	130C	

TABLE 59--Continued

Retarded				Normal				Gifted			
Sex	CA	IQ	R	Sex	CA	IQ	R	Sex	CA	IQ	R
M	15-9	73W		M	15-10	99HN		M	16-2	131HN	
				M	15-11	104HN					
F	15-3	70B		F	15-1	104HN		F	15-6	144W	
F	15-8	75B		F	15-2	104HN		F	15-6	134HN	
F	15-10	*		F	15-5	97HN		F	15-6	148HN	
F	16-4	73B		F	15-7	99HN		F	15-11	148HN	
F	17-11	67W		F	15-8	104HN		F	16-0	132C	
				F	15-9	98HN					
				F	16-2	102HN					

*IQ score not available--considered to be under 75.

TABLE 60.--Number of human movement responses by immobilized subjects

15-year-old Subjects							
Number of Human Movement Responses	Gifted		Normal		Retarded		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
0	2	1	0	2	2(1R:3)	1	8
1	0	1	1	2	2(1R:4)	1	7
2	2	1	2(1R:5)	0	0	0	5
3	1	0	1	1	1	2(1R:7)	6
4	0	1	0	0	0	0	1
5	0	1	0	0	0	0	1
6	0	0	0	0	0	0	0
7	0	0	1	0	0	1	2
8	0	0	0	0	0	0	0
Sub-total Subjects	5	5	5	5	5	5	
Total Subjects	10		10		10		30
Sub-total Reversers	0	0	1	0	2	1	
Total Reversers	0		1		3		4

The figure with R in parentheses indicates the number of reversers included in the preceding number; if no R is entered, none were reversers. The number which follows the colon is the number of N's the subject reversed.

TABLE 61.--Number of human movement responses by non-immobilized subjects

15-year-old Subjects							
Number of Human Movement Responses	Gifted		Normal		Retarded		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
0	1	1	1(R:6)	0	2(1R:7)	2	7
1	0	2	1	3	2	0	8
2	2	1	2	0	1	1	7
3	1	0	0	1	0	0	2
4	2(1R:1)	0	1	1	1	0	5
5	0	0	0	0	0	1	1
6	0	0	1(R:2)	2	0	1	4
7	0	0	1	0	0	0	1
8	0	1	0	0	0	0	1
Sub-total Subjects	6	5	7	7	6	5	
Total Subjects	11		14		11		36
Sub-total Reversers	1	0	2	0	1	0	
Total Reversers	1		2		1		4

The figure with R in parentheses indicates the number of reversers included in the preceding number; if no R is entered, none were reversers. The number which follows the colon is the number of N's the subject reversed.

TABLE 62.--Number of human movement responses by immobilized subjects

13-year-old Subjects							
Number of Human Movement Responses	Gifted		Normal		Retarded		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
0	3(1R:11)	0	2(1R:11)	3	2(1R:3)	4(1R:7)	14
1	0	1	0	0	1	0	2
2	0	0	0	1	0	0	1
3	0	2	2(1R:5)	1	0	0	5
4	2(1R:1)	1	1	0	1	1	6
5	0	0	0	0	1	0	1
6	0	1	0	0	0	0	1
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
Sub-total Subjects	5	5	5	5	5	5	
Total Subjects	10		10		10		30
Sub-total Reversers	2	0	2	0	1	1	
Total Reversers	2		2		2		6

The figure with R in parentheses indicates the number of reversers included in the preceding number; if no R is entered, none were reversers. The number which follows the colon is the number of N's the subject reversed.

TABLE 63.--Number of human movement responses by non-immobilized subjects

Number of Human Movement Responses	Gifted		Normal		Retarded		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
	13-year-old Subjects						
0	0	2	3	3	1	2	11
1	0	1	0	1(R:10)	3(1R:1)	0	5
2	2(1R:3)	0	1	0	1	1	5
3	2	2	2(2R:1 :10)	1	0	0	7
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	1	0	0	0	0	1	2
7	0	0	0	0	0	0	0
8	0	0	0	0	1	0	1
Sub-total Subjects	5	5	6	5	6	4	
Total Subjects	10		11		10		31
Sub-total Reversers	1	0	2	1	1	0	
Total Reversers	1		3		1		5

The figure with R in parentheses indicates the number of reversers included in the preceding number; if no R is entered, none were reversers. The number which follows the colon is the number of N's the subject reversed.

TABLE 64.--Number of human movement responses by immobilized subjects

Number of Human Movement Responses	11-year-old Subjects						
	Gifted		Normal		Retarded		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
0	1	0	1	0	2	2	6
1	2	1	2(1R:1)	0	2(1R:1)	0	7
2	0	1	1	1	0	1	4
3	1	2	1	2	1	0	7
4	1	1	0	2	0	1(R:1)	5
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	1	1
8	0	0	0	0	0	0	0
Sub-total Subjects	5	5	5	5	5	5	
Total Subjects	10		10		10		30
Sub-total Reversers	0	0	1	0	1	1	
Total Reversers	0		1		2		3

The figure with **R** in parentheses indicates the number of reversers included in the preceding number; if no **R** is entered, none were reversers. The number which follows the colon is the number of **N**'s the subject reversed.