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The Relation between Performance on Certain Semi-Projective Tests and Adjustment to High School

Virginia Muller
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THE RELATION BETWEEN PERFORMANCE ON CERTAIN
SEMI-PROJECTIVE TESTS AND ADJUSTMENT
TO HIGH SCHOOL

by

VIRGINIA MULLER

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

June
1961
LIFE

Virginia Muller was born to C. M. Long and Carrie Bramblett Long in Saverton, Missouri, July 13, 1911.

She was graduated from West Lafayette High School, W. Lafayette, Indiana, June 1929, and from Purdue University, June 1933. The following year she received her M.S. in Psychology and Education from Purdue University.

From 1934 to 1958 the author taught nursery school, married Ernest R. Muller, welcomed Viana and Richard into the family, took graduate courses at Columbia and Purdue Universities, served as psychologist for the Chicago Board of Education, and began her graduate studies at Loyola University in June 1958.
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CHAPTER I
INTRODUCTION

It has long been recognized that a person's understanding of an occurrence, and therefore, his action in relation to this occurrence is based on how the total situation appears to him. However, the ancients ascribed the dynamics of a person's action to fate. It is only in fairly recent times that story tellers and novelists have tried to infer character from action. One of the earliest examples in which these inferences are made explicit is in a novel by Laurence Sterne. In *Tristram Shandy*, written in 1759, Mr. Shandy, Tristram's father says:

> There are a thousand unnoticed openings which let a penetrating eye at once into a man's soul; and I maintain it, that a man of sense does not lay down his hat in coming into a room, —or take it up in going out of it, but something escapes, which discovers him.¹

Although Sterne's popularity was great and his influence upon subsequent writers immense, it was not until about sixty years ago that any attempts were made to use these intuitive "discoveries" in a scientific way. Alfred Binet pioneered the work in studying personality dynamics. Rorscharch contributed the tentative conceptual structure. Gradually, valuable psychological tools called the projective techniques were developed using the very idea that

Sterne mentioned, i.e. the inner person is revealed by a person's action.

L. K. Frank defines a projective technique as a dynamic orientation and approach to the analysis of personality involving the underlying propositions: that projective testing deals with the structure or organization of unique personalities; personalities are relatively stable configurations of dynamic processes organized around needs, feelings, and personal experiences of an individual; and that the configuration of basic dynamic processes is constantly operative in the life of an individual "patterning, warping, bending, distorting and otherwise converting every situation or experience into the configuration of the individual's private world."²

These propositions did not spring full blown from any one author's mind. Freud used the term projection to indicate a defense mechanism, ascribing to another person a trait or desire of his own that would be painful for his ego to admit.³ In 1921 Herman Rorschach published his famous ink blot test. Through careful trial and error methods he discovered the relationships between what a person reported seeing in the blots and the mental condition of that person. The three major dimensions of personality measured by this test are intellectual activity, externalized emotions, and internalized emotions expressed in fantasy.⁴


In 1935 Christiana Morgan and Henry Murray developed the Thematic Apperception Test, calling it "A Method for Investigating Fantasies". However, it was soon discovered to be a fruitful way of investigating the whole personality.

Meanwhile, Binet, 1906, Wertheimer, 1923, followed by Goodenough, 1924, Bender, 1934, and others were studying the maturational development of children's ability to perform motor tasks involving perception. And recently there have been countless variations and combinations of all of the methods of studying personality in a worthwhile attempt to define the possibilities and limitations of the various approaches to understanding human nature. Naturally the development of new tools has been difficult. Theoretical constructs lagged behind attempted practical application of methods, causing serious misunderstanding and bitter criticism of projective techniques. But by 1960 a slowly growing body of carefully controlled experimentation has revealed that it is possible to learn something about the inner man from studying samples of his behavior.

In using the Bender-Gestalt test and the Draw A Man test with young elementary school pupils it was noted that not only the maturational differences were reflected in the protocols, but that personality and emotional factors could be read from them as well. Following the line of reasoning that the maturational factors would be cancelled out, leaving only the personality and emotional variations if the tests were administered to subjects beyond the

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age at which a perfect performance could be expected, the tests have been used in the present study as projective tests rather than as maturational ones.

PURPOSE

It is the purpose of this study to provide an administrative tool to be used to discover personality and behavior difficulties of students at the very beginning of their high school careers. Once identified these students may be offered supportive help in the regular classroom situation, scheduled in special classes, or referred to specialists within the school or the community.

At the beginning of each semester a large city high school receives students from several elementary schools and, usually, some students from outside the local school system. There are, ordinarily, accompanying records of previous marks, attendance, family history and health. Too frequently, however, valid, objective information concerning the student's personality and behavior is lacking, or at best, this type of information must be inferred from the records. If the student comes from outside the system he may be admitted to high school with no records at all except for a notation of his grade level and a bare transcript of any earned credits. By the end of the first semester the receiving school has begun to get acquainted with the student, to discover his special abilities and disabilities, and to make provision for them. But in some cases the student with special personality or behavioral disabilities has already become involved in serious difficulty, has continued or developed poor work and attendance habits, has served as a catalyst for disorder or disobedience in other students, or has lost valuable
time that might have been used in correcting his own difficulties had the school been aware of them at the beginning.

For an administrative tool to be a practical one it must meet the following requirements: it must be objective; it should be usable in a group situation; it must not require more than a normal class period to administer; it should be easily and quickly scored; it should not require expensive material or equipment; it should be a task well within the students' ability; it should avoid arousing a student's anxiety or negativism; it should offer an opportunity for the student to use initiative as well as to show that he is able to follow directions.

The Bender-Gestalt Test and the Draw A Person Test were chosen because, when used together, they meet all of the requirements listed and have the additional advantages of being culture-free and not dependent upon the use of language. Since the scoring systems that have been used previously with each of the tests are rather time-consuming, modified systems, scoring the tests as one would projective tests, and requiring only inspection and sorting, have been developed.

These two tests, used in this way, are not intended as substitutes for the Rorschach, the Thematic Aperception Test or for any other diagnostic tools, but rather, as a rough screening device that will identify the need for more sensitive, more subtle, and usually, more expensive, individual diagnostic methods required for the small percentage of students who need special help. The use of the Bender and Draw A Person as screening devices will identify many different types of personality and behavioral variations.
Some of these variations will interfere with a student's adjustment to the high school environment, others may help the student in making the adjustment.

It is the purpose of the study to determine the validity of the relationship between performance on these projective tests and adjustment to high school. It is necessary to review and evaluate existing perceptual theory, as it relates to personality, in order to understand how these tests can be used to assess and predict the high school adjustment of students.
CHAPTER II

REVIEW OF RELATED LITERATURE

How is it possible to look at a few marks on a piece of paper and from them alone to know something about the person who made them? In order to understand how this might be possible we must first consider the problem of sense perception. Boring reports that "the Epicureans believed that objects emit images which enter the eye and give rise to the perception of objects." And since there is still so much Aristotelian thought in the Zeitgeist today we must consider Aristotle's original doctrine of the five senses:

In discussing any form of sense-perception we must begin with the sensible object...By the "peculiar object of sense" I mean a sense-quality which cannot be apprehended by a sense different from that to which it belongs, and concerning which that sense cannot be deceived, e.g., color is the peculiar object of vision, sound of hearing, flavor of taste. Touch, however, discriminates several sense-qualities. The other particular senses, on the contrary, distinguish only their peculiar objects, and the senses are not deceived in the fact that a quality is color and sound...To the objects of sense, strictly regarded, belong such properties as are peculiarly and properly sense-qualities, and it is with these that the essential nature of each sense is naturally concerned.

Aristotle supposed that light was a quality of a medium intervening between

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2 Aristotle, Treatise on the Principle of Life (Hammond's trans., 1902), bk. ii, chap. 6; bk. iii, chap. 1.
the object and the eye.

Although Aristotle did not carry out actual experiments in arriving at his ideas, Boring says that Descartes (1595-1650), the father of physiological psychology, did. He took the eye of a bull, scraped off the sclerotic coat at the back of it, fitted it into a hole bored in a shutter and showed that a scene viewed through it was inverted on the back of the eyeball. He felt that ideas were innate, that the knowledge of the mind was immediate, the body simply a mechanism, a machine, for letting in the scene.³

Boring shows that "to Locke (1632-1704) thoughts are not innate ideas as supposed by Descartes, they come from experience."⁴ He saw all ideas as coming from the two sources, sensation and reflection. He added "the operations of the mind" as a function of immediate knowledge. Berkeley took the next logical step after Locke, with the notion that ideas themselves were the only thing of which he could be sure; that perception was the only reality. "It is evident that, when the mind perceives any idea, not immediately and of itself, it must be by means of some other idea...Moreover, it is evident that no idea which is not itself perceived can be the means of perceiving other ideas."⁵

Meanwhile, mechanistic interpretations did not wane. Theories continued to grow during the seventeenth and the eighteenth centuries concerning vision. Accommodation was shown to be due solely to change in the size of the pupil; to elongation of the eyeball under tension from the external muscles; or to

⁴Ibid., p. 172.
⁵The Works of George Berkeley, ed. A. C. Fraser, p. 50.
change of curvature of the cornea under action of these muscles, or to the movement of the lens back and forth within the eyeball. Following Descartes, John Hunter (1794), Thomas Young (1801), Purkinje (1825), and Helmholtz (1866) supported the theory that accommodation was due to the change of the shape of the lens. 6

Newton, in his book called "Opticks", published in 1704, approached the problems of vision in a mathematical, deductive way. He presented fairly complete knowledge of the laws of refraction and of optical instruments, and their application to the problems of the eye. He contributed some psychological information, especially in respect to color. He laid down the first two laws of color mixture and described the persistence of sensation after the cessation of the stimulus. He held that singleness of binocular vision was due to the coming together of fibers from corresponding points in the two eyes. 7

In his violent opposition to Newton's color theory, Goethe, the great German poet, did not actually contribute much to the theories of vision and perception, but he stimulated Purkinje, a Czech physiologist who published two valuable works on visual phenomenology in 1824 and 1825. 8

Around 1801 Thomas Young had published papers on accommodation of the single eye for distance and had helped develop the Young-Helmholtz trichromatic theory of color: that different color qualities come from the actions

7Ibid.
8Ibid.
of different kinds of nerve fibers.

During the early nineteenth century Charles Bell and Johannes Muller both contributed to theory by bringing together and organizing scattered evidence of the independent variability of stimulus quality. According to Boring, Johannes Muller in a section for vision in his famous “Handbuch”, published in 1826, wrote that the theory of vision is merely the theory of the excitation of the retina by the optical image.\(^9\) Boring continues saying that at that time:

The common view was that perception consisted in the transmission, in some way or other, by the nerves to the brain of properties emanating from perceived objects. Muller argued that we perceive directly, not the properties of objects, but the properties of the nerves themselves. We come to know about objects because the state of the nerves corresponds to the state of objects in ways that can be perceived by sight, not an object nor even the light from it, but the extension of the optic nerve. Aside from color, the most obvious thing about visual perception is that it yields correct information about space, size, shape and position. This fact comes about because the eye as an optical instrument projects an image of the perceived object upon the retina, an image that is as correct a copy of the object as a bidimensional picture could be. It seemed to Muller that by showing how the image on the retina resembles the object, one comes near to explaining perception.\(^{10}\)

In spite of Muller’s dim awareness that one learns “up” and “down” by experience he was essentially a part of that period, 1824-1860, when almost every account of vision focused on the physics of the stimulus, the anatomy of the eye, and consequently the relation between the two. Researchers considered the eye simply an optical instrument. Since perception did not dynamically

\(^9\)Ibid.

\(^{10}\)Ibid., p. 101.
affect other aspects of behavior it could be ignored. For them, the road to truth showed the correlation between stimulus input and some aspect of overt behavior.

While the main body of experimenters followed the path of physiologizing, rejecting the mental aspects of perception, a few men were antimaterialistic in their psychology. Herman Lotze (1817-1881) was a mediator between idealism and realism, between spiritualism and materialism. In his genetic theory of space perception he noted that "the mind is capable of notion of space and that it is compelled by this notion to arrange sensory content spatially, even though that content has nothing in itself inherently spatial...Perceived space is derived from conscious data that are themselves non-spatial. How does a consciousness of space arise? By way of experience and movement." And, bringing in the realistic point of view, "every visual or tactual stimulus sets up an experimental intensive pattern that is specific for the points stimulated." ¹¹

Hering, (1834-1918) published a work in which he supported the nativistic theories of visual space perception. Gestalt psychologists of today regard perception as more dependent upon the given physical properties of the nervous system than upon the properties acquired through experience.¹²

Helmholtz (1821-1894) argued that a nativistic theory such as Hering's fails to explain the origin of our perceptual images. It simply assumes that certain perceptual images of space would be produced directly by an imborn


¹²A History of Experimental Psychology, Chap. 18.
mechanism provided certain nerve fibers were stimulated. He assures us that
the bare sensory pattern directly dependent upon the stimulus object is rare;
it is nearly always modified and extended by images provided by unconscious
influences and by memory. He argued that the empirical theory sought to
demonstrate that no other forces were necessary for perception beyond the
known faculties of the mind, even though these faculties could not be entirely
explained. Helmholtz pointed out that unconscious inferences are irresistible,
are formed by experience, are formed by analogy, thus are inductive; and that
they are dependent upon the right direction of attention. It follows then,
that perception may contain many experiential data beyond the stimulus and
that these aspects are additions which accrue to the perception in conformity
with its development in past experience. Here, then, is the beginning of a
theory that might permit itself to develop to the point of supporting as
elaborate a structure as our modern projective theory.

Wundt14 (1832-1920) the father of experimental psychology, began with an
experimental study of perception. In his terms perception was a word used in
the description of the content of consciousness. It represented the compounding
of sensations and images of past experience. Mach15 (1838-1916) asserted
that the objects of science are to be understood by reducing them to the
experiences which constitute the observation of them. He held that sensations
are not observed; they are given.

15 Ibid.
The elementists tended to think of the elements as differentiated from one another with respect to quality, but not in respect to space and time. Wundt did not think of space and time as immediate data of experience.\textsuperscript{16} It was Mach's positivism first and Kulpe's after him that helped to get the Kantian categories of space and time transferred into the class of experimental data. Later Gestalt psychology fully recognized the phenomenal status of both extension and duration.\textsuperscript{17} The conceptualization of perception was still centered around simple sensory qualities and the memory images of them.

G. E. Muller (1850-1934) contributed to the gradual sophistication of perceptual theory, especially through his students. He advanced the line of thought begun by Lotze, Mach and Hering and which was later developed by Wertheimer and Kohler\textsuperscript{18} to what is now called the Gestaltist theory.

Titchener (1867-1927) was a student of Wundt who believed that psychology should be primarily concerned with the content of awareness. He saw perception as dependent on sensory processes, faithful representation of the part of the external world with which it was concerned. There were two types of perception, pure and mixed. Pure perceptions, made up of sensations, he said, were rare. Mixed perceptions, more common, were made up of not only sensations but also images of past experience. In a mature person these images were not only kinesthetic images, but were derived from all the sense modalities. Perceptions were also understood as being more complex than sensations in that

\textsuperscript{16}Ibid.

\textsuperscript{17}A History of Experimental Psychology. Chaps. 18, 23.

\textsuperscript{18}Ibid.
they have meaning, derived from context. Though he introduced more complexity into his concepts, Titchener followed the nineteenth century static-descriptive spirit. Boring remarks:

For the most part the history of sensory research in psychology has consisted in following stimulation in from the outside, of specifying the effective stimulus more and more proximally. In the early nineteenth century a huge amount of research was undertaken to show exactly how the retinal image is formed in the eyes of various animals. In the late nineteenth century the same process was going on. There still persists the belief that, if you could get properly differentiated patterns of excitation to appropriate cortical centers, perception would occur. Almost inevitably at this point in the argument a dualist slips into the brain as a homunculus ex machina to perceive what it is that the nerves have brought in.20

Titchener might have added a tape recorder to take down the report of the sensations, but he would not have concerned himself with their origin or their development.

It was against Wundt, G. E. Muller and Titchener, their analysis of consciousness into elements, using a molecular rather than a molar approach, and their exclusion of values from the data of consciousness that the Gestalt psychologists protested. The behaviorists represented the opposite side of the age-old dichotomy and protested against the inclusion of the data of consciousness at all as proper business of psychology. American functionalists occupied a position some place between these two. Woodworth (1809-), in his middle of the road position began to perform experiments to show the importance of combining both mechanisms and ideas in a dynamic way in accounting for

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human activity, and he argued for the inclusion of what he called drive. His models tended toward the molar approach, emphasizing function rather than content. Following this approach the explanation of why things appear as they do could be based, in part, on the "set" of the individual doing the perceiving. He saw perception as an interpretative response, susceptible to the laws of learning. He believed that certain perceptions of the world became fixed through the consequences they have for the observer's adjustment to the environment.

Taking their lead from Ernst Mach, the Berlin Gestaltists, Wertheimer (1880-1943), Koffka (1886-1941), and Koenig (1887-) asked the important question of why objects appear as they do. They rejected the elementalism of the structuralists, held that perceptions are not constructed from sensations, but are immediately given in experience, organized by our nervous systems, using the fundamental principles of closure, symmetry, good continuation, proximity, and similarity. It does not follow that meaning is thus organized, for meaning is very complex, depending upon previous experience and brain events, the structure of the perception mirroring the structure of cortical organization in relation to order, but not necessarily in exact form. Thus, perceptions, as the psychological counterpart of brain dynamics, are constructs: operational links between physiological constructs and the level


of empirical data. In explaining this relationship Bender (1897-) says:

There is an innate tendency to experience gestalten not only as wholes which are greater than their parts but in the state of becoming which integrates the configuration not only in space but in time. Furthermore, in the act of perceiving the gestalt the individual contributes to the configuration. The final gestalt is therefore, composed of the original pattern in space (visual-pattern), the temporal factor of becoming and the personal-sensory-motor factors. There is a tendency not only to perceive gestalten but to complete gestalten and to reorganize them in accordance with principles biologically determined by the sensory motor pattern of action. This pattern of action may be expected to vary in different maturation or growth levels and in pathological states organically or functionally determined.

Now at last it would seem that the Hering vs. Helmholtz difference is about to surrender to the idea that nature and nurture work together, neither alone, but the fundamental isomorphism of the theory presents difficulties.

Before beginning a discussion of modern theoretical concepts of perception it seems worth while to restate that the earliest ideas about perception were concerned with the object. This concern was followed by curiosity about the eye, then with the job of analyzing and cataloging the simple discriminations of perception. Conscious content as a means of understanding perception came into vogue, followed by demonstrations of its dependence upon inborn function. The long-time preoccupation with the mechanics of seeing, followed by a similar preoccupation with conscious content delayed the recognition of the distinction between perceptual phenomena and perception as a theoretical concept. Modern theories have different but parallel weaknesses in that they are overly concerned with quantification, are so abstract and are stated in

such general terms that they are often difficult to apply to natural events, and fail to explain satisfactorily how meaning is assigned to a perceived event.

Following the long and honorable heritage of a physiological approach to perception Hebb (1904– ) has developed what he calls a cell-assembly theory of perceptual development. It is based on a telephone switchboard type of a model, allowing the complexity and flexibility necessary for a field approach to perception. It provides a means for explaining the role of experience, especially early experience, in structuring perceptions. He shows how the first, essentially random spreads of excitation become organized into functional units, with repeated receptor stimulation. He sees even the simpler perceptions going through a long course of development. The units develop stability with exercise and as experience increases the cell assemblies combine into more complex organizations called phase-sequences. With this model Hebb feels that he can account for both specificity and enrichment of perception including expectancy and learning. More research is needed to show how this model can be applied to actual situations.25

One way to integrate theories of perception into general theories of conditioning and learning is to treat perception as a response. Graham's (1906– ) behavioristic psychophysical approach is an example of such a theory using simple discriminations, care being taken to create experiments which give quantitative results that are easily interpreted. The very simple

designs preclude the possibility of understanding the interactions among raw materials of perception. Like many S-R experiments the conditions of observation are so restricted in order to have rigorous control that the data resulting from the experiments have very limited application.26

Gibson's (1904- ) approach is a psychophysical one in which he is concerned with literal perception, especially of solid objects of the three-dimensional visual world. He assumes that awareness of these objects is given in a nativistic way by a kind of isomorphism between the spatial properties of the stimuli and the retinal events they produce. Through learning, that is through increased capacity for discrimination and gradual awareness of greater detail, perceptions acquire meaning.27 Although some meanings are embryonic, in the same way that literal perception is, most perceptions must be structured before meanings can be assigned. His studies on size constancy do not yield results similar to those done by Lambert, Solomon and Watson,28 but he contributes valuable ideas concerning ordinal stimulation and shows that the retinal correlate is not a picture of the external world.

Attneave (1919- ) has handled the need to quantify perceptions by applying the information theory model to form perception. In doing so he assumes an isomorphism between the spatial properties of an object and a person's


perception dependent upon a mechanism which scans the stimulus input. The trouble is that this method does not provide for new perceptions.29

Over the last twenty-five years Helson (1898- ), has been working at what he calls an adaptation-level theory. This theory tries to combine the psychophysicist's goal of quantification and the Gestalt definition of the problems of perception. The theory begins with the assumption that perceptual responses may be represented as a function of the difference between a stimulus process and an internal standard arrived at by pooling the effects of previous stimulation. Both the characteristics of the stimuli, for example, magnitude, frequency, or nearness in time, and the background of the stimuli are considered. The model used is formal rather than material, with the organism rather like a logarithmic computer. Although the model is a mathematical and therefore static-descriptive, adaptation-level theory has functioned as a predictive tool in many situations. Recently, Helson has used this theory to scale the value of terms having quantitative aspects and to demonstrate the effect of context on values as well as to study the effects of group of personal factors upon the expression of attitudes.30 If adaptation-level theory develops to the point of providing a set of mathematical expressions to define parameters such as rigidity-plasticity of the judgmental system, the stability of the reference level, the range in intensity and in time of the reference level,


and the relationship of the relevant variables (as well as the nonrelevant stimulus input) it will be a valuable tool indeed.

Another variation of Gestalt psychology is the Werner (1890- ) and Wapner (1917- ) sensory-tonic field theory of perception. These authors subscribe to the active and interactive characteristics of perception but consider a simple motor theory inadequate to explain the projective aspects of perception. In order to accommodate sensory-motor interaction they propose a sensory-tonic theory in which tonus refers not only to the distribution of muscular tension, but also to the level and pattern of visceral reactivity. They define perception as a "total dynamic process" patterned by the nature of sensory input and by the posture and motion status of the perceiving organism.31 They test the validity of the theory by postulating that tonic factors interact with sensory factors in perception formation and that sensory and tonic factors are dynamically equivalent. Their studies contradict any assumption of a dichotomy between sensory and motor cortical function and require a concept of field-type interaction which they feel demonstrates the existence of a sensory-motor cortex. To date their studies have focused on asymmetrical arousal of tension in voluntary musculature, but their theory provides a means of accommodating the problem of motivation and emotion in perception through visceral tensions.32 If we are to use this theory in


explaining how projective techniques are possible we must first understand how these tensions are translated into motor-behavior and we must learn the characteristic patterns for release of, or defense against, the various kinds of tensions.

Brunswik followed Woodworth in being a functionalist in perception and also in failing to advance a highly elaborated theoretical structure. Her work on perceptual probability learning showed the relationship of the structure of perception to patterns of past experience and to goals and aims. She also cautioned of the possibility that "apparent opposites such as extreme abstractness and extreme concreteness may be psychologically closer together and more apt to combine with each other in the same subject than any of these would with an intermediate position." In another example, "it was shown that the need for aggression may either be openly expressed - one extreme - or else lead to general tenseness with a minimum amount of overt aggressiveness - the opposite extreme within a system of "alternative manifestations". If exaggerated aggressiveness is openly manifested, this in its turn correlates often with indications of a need of an opposite kind, for instance, the need for dependency." It is felt that these warnings are timely especially in view of the following theory.

Similarly, Ames (1908- ) and Cantril (1906- ) defined perception as a process by which a person attributes significance to events in his environment.

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33 Else Frenkel-Brunswik, "Emotional and Perceptual Personality", in Perception & Personality, A Symposium, p. 138

He interprets what he sees on the basis of his past experience and his present expectations derived from these experiences. Since there are, almost, an infinity of configurations which will produce the same pattern on the retina, perception is not a passive process, nor is it immediately given by the characteristics of the world and of the eye, but, rather it is the product of learning.35

Very like the transactionists Ames and Cantril in outlook, Bruner (1915– ) and Postman (1912– ) began a long controversial series of experiments in the late 1940′s. While they recognized that there are stimulus patterns which need no elaboration in perception, they contended that many times we see what we need to see, or what we are used to seeing. Although, at times, the recognition of personally relevant objects may be withheld from consciousness, a person who is motivated is alert to the presence of these objects and responds to them.36 To the Gestaltists′ fundamental principles of closure, symmetry, good continuation, proximity and similarity Bruner and Postman would add defense, selectivity, accentuation, vigilance, fixation, etc. They attempt to account for the active, purposeful characteristic of perception by uniting its pictorial aspects with expectancy.37 They have found that "perceptual responses deteriorate and become less adaptive when they are made under


Along with the usual criticisms of technique, vague theoretical thinking, failures at replication, and flaws in experimental design, a serious criticism is that the theory does not state when one of the functional principles gives way to another one, nor how they combine. Also, in our present impoverished state of experimental evidence in regard to motivation, other than those of hunger and thirst, the implied one-to-one relationship between a list of presumed motives and perception suggests over-extension of a good idea.

While some progress has been made in broadening our concepts of perception, modern theorists are faced with the difficulty of making meaningful differentiations between sensation and perception and then between perception and conception. The role of attention in perception creates further complications. Perhaps what is needed is a formula showing how much of each is combined and under what conditions in order to result in a particular bit of behavior.

Others who have done experimental work in trying to determine the importance of individual differences in perception include Witkin (1916- ). He notes that to allow translation of the subject's perception into a quantitative result, a test requires some measurable action from him. He states that "personal factors are most likely to play a determining role in perception when broad, significant, complexly integrated perceptual experiences are involved". He explains that the term "personal factors" was used to refer


to general psychological characteristics of the individual (motivational, cognitive, emotional) that may influence his perception. He goes on to say:

In ordinary experience the perceptual situations with which the person is confronted range in a continuum from highly ambiguous to well-structured ones, with the latter occurring more frequently. As one progresses through this continuum, personal determinants become less important and perception is increasingly dictated by the structure of the situation. It is therefore to be expected that the readiest evidence of the importance of personal factors in perception should be derived from ambiguous situations, where, in the absence of any compelling organization in the material itself, the person has greater opportunity to structure it in his own unique fashion.40

On the other hand, completely ambiguous situations, (the measurable actions from them) are difficult to score and are not adaptable to group administration.

The following section will describe some of the contemporary attempts to relate perception and the measurement of behavior.

MEASUREMENT OF INTELLIGENCE BY DRAWINGS

In 1926 Florence L. Goodenough (1886- ) published her study of the relationship between the development of children's mental ability and their drawings. In the very beginning she states:

Previous investigations have suggested that the drawings may afford a valuable index to the nature and organization of the child's mental processes, and may throw light on some of the characteristics of mental growth.41 As early as 1885 Ebenegar Corke published an article on children's drawings in which he described the successive stages of development as he had observed them. In 1887 Corrado Ricci published an account of the drawings of a group of Italian children whom he observed during a summer's vacation.42

40 Ibid., p. 145
42 Measurement of Intelligence by Drawings, p. 1.
Goodenough worked out a scoring system that correlated .76 with the Stanford Binet mental age, when it was used with the age range of four years through twelve years. She noted some interesting differences between boys and girls: boys drew head and feet in profile more frequently, were more apt to include accessory characteristics, pipe, cane, neckties, etc. They were more apt to show the figure in action; they drew figures with longer arms. Girls drew their figures with small feet, emphasized the eyes, used a Cupid-bow mouth and two dots for the nose. They were more apt to draw the hair smooth. Goodenough also observed that more of the clinic children drew the opposite sex to themselves than did normal children. She commented that "It is the writer's opinion that if properly understood, (drawings) could contribute much to our understanding of a child's interests and personality traits." Later she said: "Tentative experimentation suggests the possibility of devising a method of scoring drawings in such a way as to throw light on functional mental disorders, but such a method has not yet been developed." Goodenough's pioneer work in developing an age level scale for children's drawings has made possible the use that she predicted for drawings.

PERSONALITY PROJECTION IN THE DRAWING OF THE HUMAN FIGURE

In 1945 Karen Nachover, (19 - ), published her method of personality investigation as monograph in the American Lectures in Psychology series. The advantages of using the figure drawing method as a projective are that the test is simple to administer and no special tools are needed, no complicated

43 Measurement of Intelligence by Drawings, p. 30.
44 Measurement of Intelligence by Drawings, p. 82.
scoring is required, the drawings may be preserved indefinitely, the drawings offer direct testimony of the subject's projection, rather than verbal description of it, the drawings do not require the use of language and may be used with foreign or illiterate people. In discussing the phenomenon of projection Machover says that:

External figures are too varied in their body attributes to lend themselves to a spontaneous, composite, objective representation of a person. Some process of selection involving identification through projection and introjection enters at some point. The individual must draw consciously, and no doubt unconsciously, upon his whole system of psychic values. The body, or the self, is the most intimate point of reference in any activity. We have, in the course of growth, come to associate various sensations, perceptions, and emotions with certain body organs. This investment in body organs, or the perception of the body image as it has developed out of personal experience, must somehow guide the individual who is drawing in the specific structure and content which constitutes his offering of a "person". Consequently, the drawing of a person, in involving a projection of the body image, provides a natural vehicle for the expression of one's body needs and conflicts.45

The drawing may represent the person's deepest wishes, a vigorous compensation for defects, a frank exposure of defects, or a combination of these factors. All kinds of distortions, disproportionate organ emphasis, inconsistencies or other bizarre effects occur when rational control is weakened through psychosis or through organic brain disease. Some difficulty in normal identification may be assumed when the drawing is quite different from the sex, age, race, etc., of the subject, himself. The subject ordinarily omits details that do not fit in with his immediate preoccupations. Drawings of young people are more varied and richer in detail than those of older people. Drawings that

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45Karen Machover, Personality Projection in the Drawing of the Human Figure. Springfield, Ill., Chas. C. Thomas, 1948, p. 5.
may be appropriate to normal growth phases in children may be in adults of
average mental ability significant of neurosis, depression, regression, etc.
Stylistic drawings may be analyzed even though they are facetious, over-
simplified or cartooned. People who make such drawings tend to handle their
problems in concealed or in exhibitionistic ways. The factors of placement,
size, pressure of pencil, joining, erasures, proportions, differentiation of
detail and the general distribution of graphic energy may be read in the
usual way. Not only is the content of the drawings, that is, the individual
parts of the body, the clothing, the accessories, the facial expression and
the postural tone of the figure, important in understanding the person being
studied but also of importance are such features as proportions, perspective,
reinforcements, shading, erasures, detailing, degree of completion, etc.
Much of Machover's book is devoted to detailed interpretation of these points
based on experience and research. She states over and over again that a
thorough knowledge of personality dynamics is necessary for the understanding
and use of this method.

Silverstein and Robinson have used concepts similar to those of Machover
in a study of orthopedically handicapped children which showed the children's
tendency to indicate their type of handicap in their drawings.46

A VISUAL MOTOR GESTALT TEST AND ITS CLINICAL USE

In 1938 the American Orthopsychiatric Association published Lauretta
Bender's monograph describing her work with the Motor Gestalt test. She
standardized the test as a performance test for children and found that the

46A. B. Silverstein and H. A. Robinson, "The Representation of Orthopedic
Disability in Children's Figure Drawings". J. Consult. Psychol., 1956, 20,
p. 333-341.
average child of seven could reproduce figures "A" and "5" accurately, and that by age ten, all the others with the possible exception of figure "7".

She noted that the way an individual handles an experience depends not only on the degree of biological development of the visual motor area, but also on the behavioral patterns he has developed. She found that she could see signs of rigidity, withdrawal, repression, depression, self-assurance or exaggerated anxiety in the test productions. As in all psychological testing, no one deviation should be considered to have diagnostic significance. The visual motor reactions are total reactions between the individual and the stimulus, determined by the individual's ability, his age, emotional stability, habitual adjusitive mechanisms, moods, and degree of equilibrium.

In her work with children Bender found that "some children rated as mentally defective by the standard tests and social criteria are able to handle the visual motor gestalten in a normal or superior fashion." She shows the many ways that this fact may be explained when she said:

It must be realized that many individuals who function as mental defectives do so not because of a hereditary retardation in matur- ation, but because they are constitutional deviates of some other sort; or because of some subsequent brain pathology. It is therefore possible to get every sort of deviation in the personality reaction and in the gestalt function. Detailed analysis leads to the conclusion that many individuals who are functioning as mental defectives show evidence in their gestalt drawings of more or less severe aphasic disturbances which are characterized by the use of a perseverated primitive symbolic unit while others show the dissociative phenomena characteristic of schizophrenia; and still others show disturbances in impulses with a poverty of response or hyperkinetic features; and finally others show perceptive difficulties, confusional features, with disorientation of whole

figures or parts of the figure on the background.\footnote{Ibid., p. 149.}

Since an understanding of the terms is of importance in discussing Bender's work, some of them will be reviewed here. Disturbances in personality integration are shown in test productions in varying ways. Indications of uncertainty regarding the correctness of the copy, are shown when the subject has need to go over some lines he had drawn. There is clear evidence of serious regression and personality disruption when fragmentation and complete destruction of the gestalten occurs. Fragmentation results when the subject cannot treat the gestalten as a unit but sees it as a number of separate entities. This may be a perceptual or a motor inadequacy. The destruction of the gestalten involves a complete distortion of the pattern. Bender speaks of a person's need to handle the gestalten on a concrete level and ascribe to them specific meanings. An example would be the subject who saw figure "3" as a flock of birds flying and so proceeded to split up the figure into three distinct parts, a symptom of serious regression. Displacement is defined as relating the various parts of a figure in a deviant way. It would seem that the subject is able to separate a figure into its components, but is unable to complete the resynthesizing process. Rotation refers to the entire figure and indicates a disturbance in spatial orientation. This is not uncommon in some left-handed people, in young children and in children with reading disabilities. Primitivization and over-simplification are expressed in a tendency to use the enclosed loop in every instance possible, to try to conserve energy by substituting a continuous line for the more effort-consuming task of
making separate dots. Lack of inhibition shows itself in the enlarged size of the productions and the large amount of space left between the parts of the figures. Elaboration occurs where the presented stimulus acts as a springboard for the subject's own preoccupations and needs and he copies the figures in his own terms rather than following the lines of the stimulus.

There are two kinds of perseveration: one when the subject continues to repeat the pattern, the other when a pattern or parts of a pattern influence the succeeding one. Other factors considered in evaluating a protocol are ability to copy angles, exaggeration or minimization of curves or angles, quality of line, size of figures, crowding or overlapping of figures, and placement of the figures along the edges of the paper.

The test's reliability has been established by repeated administrations to individuals lacking gross personality deviations, showing that there is a consistency in the test performance of subjects who are making a relatively stable adjustment.

Bender's experience with the test permits her to say:

The visual motor gestalt function is a fundamental function associated with language ability and closely associated with various functions of intelligence such as visual perception, manual-motor ability, memory, temporal and spatial concepts and organization or representation.49

She has studied the protocols of persons in acute confusional states which occurred in connection with both alcohol and marihuana intoxication, bromide and mescaline poisoning, organic disease of the brain, postepileptic state, thalamic disturbances, and schizophrenic and manic-depressive psychosis. She

49 Ibid., p. 112.
found that in these states there is "inadequate comprehension of the environment with the additional symptom of dissatisfaction with the inadequacy." The drawings show reversion to more primitive responses, difficulties with integrating the parts of the figure into a whole gestalt, specific tendencies of disorienting the whole on its background. The background may be looked upon as a part of the gestalt and this type of disturbance in orientation is a disturbance in the most fundamental principle in gestalten, i.e., the relationship of figure and ground.

The drawings of an intelligent person with incipient dementia paralytica show stilted, excessively careful perfection that tends to be formalistic and to lack any personal interest. There is evidence of reversion to some primitive tendencies. The drawings of a person with productive dementia paralytica show substitution of various letters or numbers for the dots; the structure of the gestalten is partially disorientated from its background; the figures are constructed from superficial appearance rather than from their genesis; or some other figure is substituted for individual parts. She comments that this last tendency is rather akin to confabulation (in Rorschach terms) and that one has the feeling that it is somewhat playful but rather senseless.

In discussing sensory aphasia Bender suggests that the larger principles in the organization of the gestalt were more significant and persistent than the details...often exaggerated; there is a tendency to revert to more

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50 Ibid., p. 54.
51 Ibid., chap. 3
primitive reactions (those of children or mental defectives); there is a tendency for more compact, enclosed, energy-saving responses than the stimuli suggest; there is a tendency to use unit symbols influenced by the preceding figure. She finds that there is a marked tendency to uninhibited perseveration of unit symbol, of preceding responses, and of principles of organization. She also notes that recovery from cerebral insult showed the same type of progressive integrative maturation, with episodes of sudden insight that is shown in normal development. 52

In Chapter nine of her monograph Bender discusses the protocols of schizophrenic patients. She notes that "It seems characteristic of the schizophrenic subjects that one part of the figure is disoriented in relation to another part, or that the dissociation of parts is so marked that one part does not help in the orientation of another." 53 Or, there may be disorientation or spatial separation of a part of the figure by a movement in the radial direction on the horizontal plane or by a rotary or vertical movement to an angle of 45 degrees. There are tendencies to revert to more primitive principles such as changing dots to loops, drawing only parts of the figure, representing dotted lines as wavy lines, drawing very small figures, drawing principally on the horizontal plane, avoiding crossed and angulated forms, splitting of the visual-motor pattern, as well as failing to integrate the whole configuration or to relate some parts to the whole. 54 In summing up she comments: "It might be assumed that the higher the intellectual level,

52 Ibid., chap. 7.
53 Ibid., p. 99.
54 Ibid., chap. 9.
the greater the number of possible dissociations as the integrative and associative functions are more elaborate."55

Of the other people who have done rather extensive work with the Bender-Gestalt test, Max Hutt was one of the earliest. He used the test in an army-medical setting and added some concepts of his own to Bender's original formulations. He suggested having the individual taking the test comment on each of the figures when he had completed that figure, or at the end of the entire group of figures. He felt that he could thus tap symbolic material and fantasy activity.56

Billingslea devised a method involving very careful measurement of curves and angles, but the amount of work involved did not seem to be justified by greater accuracy or greater scope of the test.57 Harriman and Harriman used the test successfully as a measure of school readiness for six year olds,58 and Krein studied the relationship between perceptual performance and adjustment of school children. Fifty-six children, divided into two equal groups on the basis of a criterion of adjustment were tested. The findings supported the hypothesis that well adjusted children were better perceptual performers


than were poorly adjusted children. Byrd used the Gestalt test in studying children in need of psychotherapy and children judged well adjusted. These studies showed that well adjusted children were better perceptual performers than poorly adjusted children. Many of the so-called clinical "signs" failed to discriminate between well adjusted and poorly adjusted children.

A study done at the Children's Mental Health Center, Columbus, Ohio, by Koppitz, Sullivan, Blyth and Shelton used the Bender Gestalt Test and human figure drawings in predicting first grade school achievement. This study used the tests for evaluating both maturational development and emotional problems. Socio-economic and cultural variables were thought to influence the scores. Special scoring methods were used. The authors found that the human drawings contributed factors to the prediction of first grade achievement which were not measured by the Bender.

Pascal and Suttell developed a scoring method for the Bender-Gestalt Test to be used with adults. This method considered each figure separately and assigned a numerical weight to each possible fault or error in reproduction. The manner in which the figures were placed on the paper, order, overlap, etc., were scored also. Then the total raw score was converted into a


61 Elizabeth M. Koppitz, John Sullivan, David D. Blyth and Joel Shelton, "Prediction of First Grade School Achievement with the Bender Gestalt Test and Human Figure Drawings", Amer. J. Ortho., 1958, 28, 2, 164-168.
standard score. The authors were careful to follow Bender's original concepts and terminology. 62

Murray and Roberts used the test with a patient passing through a brief manic-depressive cycle and showed that "when the patient was depressed the figures were drawn within a constricted area, but when manic they were rotated, distorted and poorly placed." 63 Two follow-up administrations were normal. The authors cautiously state that the results lend some support of the validity of the test as a measure of personality constriction and expansiveness.

This chapter has traced the long developmental process back to our present visual theories. It has shown the age-old dichotomy between the mechanistic approach, i.e., that perception consisted in transmission and the eye was simply an optical instrument, and the idealistic approach, that ideas themselves were the only reality in understanding vision and perception. The rise of nativist theory was described. The attempted reconciliation of divergent points of view on the part of the American functionalists was noted. There was a brief review of some of the contemporary visual theories. The chapter closed after describing some of the work that has helped to show the relationship between personality patterns and visual perception.


CHAPTER III

EXPERIMENTAL DESIGN

This thesis is an attempt to determine whether or not the Bender-Gestalt Test and the Draw A Person Test, employed as semi-projective techniques and evaluated by an inspection-sorting method, can be used to predict a student's adaptation to the high school situation.

The demands of the problem chosen require that the experimental design for this study be what Edwards\(^1\) calls a Case 7 problem, \(S_x \rightarrow O_y \rightarrow R_z\).

Edwards defines his terms thus:

\(S_x\): Stimulus variables: may consist of relatively simple things, such as electric shock, light, sound, pressure or temperature. These may be quantified by measuring the physical intensity of the stimulus variable. There are other stimulus variables for which we have no measures corresponding to physical intensity: problem-solving situations, motor conflict situations, social situations.

\(O_y\): Organismic variables arise from the ways in which organisms may be classified and from the observations and measurements of physical, physiological and psychological characteristics of organisms. For example, we may measure the heights or weights of a group of individuals, and the resulting measurements would constitute a quantitative and continuous series of observations. They are neither response variables nor stimulus variables.

\(R_z\): Response variables may consist of simple responses such as finger flexions, knee jerks, pupillary responses, heart beats, respiratory changes or complex response patterns as motor behavior in typewriting, tennis playing or even aggression, dominance, leadership and social adaptability.

In this study the $S_y$ will be two tests, The Bender-Gestalt and the Draw A Person. The $O_y$ will be the subjects who are under the mild stress of being in a classroom situation and who react to this stress in an adaptive or in a non-adaptive way. The $R_z$ is the score of these subjects on the two projective tests given. From an analysis of the $R_z$ we expect to be able to predict, within certain limits, whether or not the subjects will respond to the total high school situation in an adaptive or in a non-adaptive way. In order to show the relationship between the test responses and the students' adjustment to high school the following information was gathered and analyzed. The student's level of ability was assessed, in most cases, by the Differential Aptitude Test.\(^2\) His adjustment to high school was determined by his academic grades, his teachers' ratings, and his record in the discipline office. Since the scores on the two tests administered and the scores yielded by the teachers' ratings and the discipline office records are simply classificatory, i.e., are measured on a nominal scale without being able to say how much more or less the various points on the scale represent, nonparametric statistical tests have been chosen for treating the data. Siegel has this to say about parametric and nonparametric statistical tests:

A nonparametric statistical test is a test whose model does not specify conditions about the parameters of the population from which the sample was drawn. Certain assumptions are associated with most nonparametric statistical tests, i.e., that the observations are independent and that the variable under study has underlying continuity, but these assumptions are fewer and much weaker than those

associated with parametric tests, (i.e., that the observations must be drawn from normally distributed populations, that these populations must have the same variance). Moreover, nonparametric tests do not require measurements as strong as those required for the parametric tests; most nonparametric tests apply to data in an ordinal scale, and some apply also to data in a nominal scale.³

Since the sample is the incoming freshman class of a large, city high school, it cannot be said that the population is normally distributed. But even though we could satisfy such an assumption, the teachers' ratings and the scores obtained from the discipline records are classificatory. Siegel states the advantages of nonparametric statistical tests as:

1. Probability statements obtained from most nonparametric statistical tests are exact probabilities (except in the case of large samples, where excellent approximations are available), regardless of the shape of the population distribution from which the random sample was drawn. The accuracy of the probability statement does not depend on the shape of the population...² If sample sizes as small as N equal 6 are used, there is no alternative to using a nonparametric statistical test unless the nature of the population distribution is known exactly...⁴. Non-parametric statistical tests are available to treat data which are inherently in ranks as well as data whose seemingly numerical scores have the strength of ranks. That is, the researcher may only be able to say of his subjects that one has more or less of the characteristic than another, without being able to say how much more or less...⁵. Non-parametric methods are available to treat data which are simply classificatory, i.e., are measured in a nominal scale.⁴

In order to determine whether or not the two tests, used in the way described in chapter four, could be used to predict adjustment to high school the following null hypothesis was presented; that there is no difference in high school adjustment between the group of students who earned high scores


⁴Ibid.
on the tests and the students who earned low scores on the tests. Thus, the null hypothesis can be refuted only if there is found to be a significant difference between the two groups of students.

The method used to determine the significance of the difference between the groups was to compute chi square by means of a two-way contingency table method described by Mayo in a recent Psychological Newsletter. He explained that "there are two formulas available, depending upon whether there are a greater number of rows or of columns...when the number of rows and columns is equal, either formula may be used." The formula for machine computation used in this study follows:

\[
X^2 = n \cdot \left\{ \sum \left[ \frac{i}{ni} - \left( \frac{n^2 \cdot ij}{ni \cdot nj} \right) \right] - 1 \right\}
\]

The following notations are observed:

- \(r\) denotes the number of rows
- \(c\) denotes the number of columns
- \(n_{ij}\) denotes the cell frequency common the \(i\) th row and the \(j\) th column
- \(n_{i.} = \sum_{j} n_{ij}\) is the total frequency for the \(i\) th row
- \(n_{.j} = \sum_{i} n_{ij}\) is the total frequency of the \(j\) th column
- \(n_{.i} = \sum_{j} n_{ij}\) denotes the total frequency
- \(n_{..} = \sum_{i} n_{ij} = \sum_{j} n_{ij}\) for the table.

Mayo has worked out a geometric interpretation of the symbolism for the contingency table. This interpretation, shown in Table I, page 63, was used as a model and the observed frequencies were cast in such a table. An example of a computational table used to find the value of chi square, showing

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6Ibid.
the number of degrees of freedom and the significance level is shown in Table II, page 69. Contingency tables for the following sets of data are shown in Tables III through VI, pages 70 through 73: Bender-Gestalt scores and differential aptitude test scores, Bender-Gestalt scores and students' grades, Bender Gestalt scores and teachers' ratings, Bender-Gestalt scores and discipline scores. Similar tables for Draw A Person scores and differential aptitude test scores, Draw A Person scores and students' grades, Draw A Person scores and teachers' ratings, Draw A Person and discipline scores are shown in Tables VII through X, pages 74 through 77. Table XI, page 78, shows the contingency table for the Bender-Gestalt Test and the Draw A Person Test. Table XIII, page 79, shows the Bender-Gestalt scores and the pooled scores for intelligence, teachers' ratings, and discipline scores. If a student was failing to adjust to school, as shown by a score of 1 or 2 on any one of the criterion factors: intelligence, teachers' ratings or discipline scores, he was placed in the non-adjusting group, if his score was 3 or more on each of these factors, he was placed in the adjusting group. Table XIII, page 80, shows the Draw A Person scores and the pooled scores for the criterion factors.

After the value of \( \chi^2 \) has been computed by formula the significance of the observed \( \chi^2 \) was determined by reference to Guilford's Table E, Table of Chi Square\(^7\) using the appropriate degree of freedom.

A second problem pertinent to this study relates to the determination of whether or not the scoring system used is communicable, i.e., whether or not others obtain similar results in judging the protocols when using it. In order

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to determine whether or not there is agreement between the raters of judges of the Bender-Gestalt Test protocols and of the Draw A Person Test protocols. Englehart's\(^8\) adaptation of Ebel's\(^9\) analysis of variance method of estimating the reliability of ratings was used. Table XVI, pages 128 and 129, is an illustration of the procedure used. There is one score or rating in each cell. There are as many columns as raters, there are as many rows as individual students. The sample of ten percent of the total number of students was chosen randomly by entering a table of random numbers to determine which of the numbered protocols would be selected. Ordinarily larger samples yield similar results, thus a ten percent sample is considered adequate. The formula for average reliability of the ratings of several raters is:

\[
r_{tt} = \frac{S_r^2 - S_e^2}{S_r^2 + (C - 1)S_e}
\]

The formula for the reliability of the averages of the ratings:

\[
r_{\bar{r}t} = \frac{S_r^2 - S_e^2}{S_r^2}
\]

The following notations are observed:

- \(r\) denotes the number of rows
- \(c\) denotes the number of columns
- \(S_r\) denotes the sum of squares for rows
- \(S_c\) denotes the sum of squares for columns
- \(S_e\) denotes the sum of squares for error
- \(S_t\) denotes the sum of squares for total.

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The reliability of the raters used for this study is shown in Table XV pages 82 and 83.

This chapter has set forth the problem investigated, explained the type of experimental design used, described the group of statistical tests employed and noted the statistical formulae followed. After a discussion of the methods employed in gathering the data the results will be presented.
CHAPTER IV

PROCEDURES

The two tests used in this study, the Bender-Gestalt Test and the "Draw A Person" Test were administered to groups of students in their ordinary classes in a high school. The nine simple designs of the Bender-Gestalt Test were projected on a screen in a semi-dark room, one after another. Permission to administer the test in this manner was secured from both the author of the test, Dr. Lauretta Bender, and from the American Orthopsychiatric Association, its publisher. The directions for taking the test were: "We are making a study of how well teen-agers can see these types of designs. I will show the nine designs on the screen, one after another and you are to copy them on your paper. Please use only one side of the paper. This test will not affect your class grade, but please work carefully since we want to compare the work from this school with that of another." No mechanical aids were permitted, no time limits were imposed; however, the subsequent design was projected as soon as each one was completed by the group. Typewriter paper was used vertically; lead pencils were supplied; erasures were permitted.

As soon as the nine designs were completed the pupils were requested to turn the paper over and were instructed: "You are now to draw a person. Please draw the whole person, not a stick figure." All questions were answered with a smile and some such statement as, "you decide", "it's up to you", or "however you would like it". The pupils were assured that "this is not a test
of your drawing ability, we just want to see how teen-agers do". A time limit of ten minutes was announced, a warning time of one minute was given before the papers were collected. In no instance was the test refused by a pupil in a regular high school class. For the most part the students seemed to enjoy the tests and to be mildly curious about the purpose of them.

Following Bender's\(^1\) original monograph closely a rapid scoring method was developed which permitted the protocols to be sorted by inspection. This method was similar to that developed by Pascal and Suttell\(^2\) in that the same concepts of "organization", "Gestalt", "proportion", "rotation", "overlap", "work-over", etc. were used. However, instead of assigning a numerical value to each fault in each figure, summing these for every figure and finally summing for the total protocol score, the protocol was judged as a whole and assigned to one of the five categories described below. The categories ranged from number 5, i.e., those protocols that were well organized and well proportioned and that had the figures accurately copied, through number 1, i.e., those protocols that were completely disorganized and badly proportioned and that had figures copied so that the Gestalt of the design was destroyed. A particular protocol need not have all the faults listed in a category in order to be placed in that category. And if, as a whole, it belonged in category 3, for example, it was placed there, but if it had any of the described "key-points" it was lowered to category 2.

\(^1\)A Visual Motor Gestalt Test and Its Clinical Use.

\(^2\)The Bender-Gestalt Test: Its Quantification and Validity for Adults; with Scoring Manual.
KEY FOR SCORING THE BENDER-GESTALT TEST

The Bender-Gestalt Test was scored on a five point scale with 5 representing the highest score and 1 the lowest score. After the protocols were assigned to one of the five categories on the basis of the scale described below, they were given a final point score keeping these "key-points" in mind. A score was lowered one point from what it would otherwise be if there were excessive erasures, smudges, extraneous material added, extremes in pressure of the pencil on the paper, extremes in slant of the figures.

The figures in CATEGORY 5 show:

- good organization and use of the available space of the paper.
- good proportion, one part to another, one figure to another.
- proper shape, dots are dots, loops are loops.
- proper slant. 3

The figures in CATEGORY 4 show:

- some lack of organization but use of the available space of the paper.
- fair proportion, one part to another.
- variation in size from one figure to another.
- slight discrepancy in shape. 4

The figures in CATEGORY 3 show:

- lack of organization.
- limited use of the space of the paper, i.e., all figures at the top, bottom or along one side.
- some substitution of dots for loops or visa versa.
- occasional substitution of line for dots or loops.
- slight retracing of lines, "work-over".
- minor extension of lines beyond the limits of the figure.
- poor angulation, poor juxtapositioning, but Gestalt maintained.
- the use of guide lines to determine the slant of dots or loops. 5

3 fig. 1, p. 95.
4 fig. 2, p. 96.
5 fig. 3, p. 97.
The figures in CATEGORY 2 show:

- great lack of organization.
- rotation on the paper.
- irregularity of size.
- poor curvature, break in a curve.
- some separation of parts of a figure.
- slight perseveration (of a figure) or from one figure to the next.
- great extension of lines beyond the limits of a figure.
- separating or enclosing lines.
- tremor.⁶

The figures in CATEGORY 1 show:

- complete lack of organization, confusion.
- great perseveration carried from one figure to another.
- great perseveration within the figure.
- the Gestalt destroyed.
- retracing of lines to the point of digging into the paper, excessive "work-over".
- numbers, letters, stars, etc. used to form the figure.
- a figure drawn so that it overlaps another.
- extreme separation of the parts of a figure.
- some parts omitted.
- distortion of the shape, or an extra row added to a figure.
- addition of inappropriate detail.⁷

Examples of these scoring categories are shown in the appendix, figures 1 through 9.

**KEY FOR SCORING THE "DRAW A PERSON TEST"**

The Draw A Person Test was scored on a five point scale with 5 representing the highest score and 1 the lowest score. After the protocols were assigned to one of the five categories on the basis of the scale described below, they were given a final point score keeping these "key-points" in mind. A score was lowered one point from what it would otherwise be if there were

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⁶fig. 4, p. 98; fig. 5, p.99; fig. 6, p. 100.

⁷fig. 7, p. 101; fig. 8, p. 102; fig. 9, p. 103.
excessive erasures, smudges, "empty eyes", extremes in pressure on the pencil, extremes in slant of the figure.

The figures in CATEGORY 5 show:

- good organization and use of the available space of the paper.
- all essential parts.
- the parts in proportion to each other.
- some movement.
- some added, appropriate detail.
- even pressure of the pencil on the paper.\(^8\)

The figures in CATEGORY 4 show:

- some lack of organization but use the available space of paper.
- all essential parts.
- some faults in proportion OR
- lack of movement OR
- lack of detail.
- uneven pressure of the pencil on the paper.\(^9\)

The figures in CATEGORY 3 show:

- lack of organization.
- limited use of the space of the paper.
- stiffness and rigidity.
- parts that are badly proportioned AND
- no movement AND
- no detail.\(^{10}\)

The figures in CATEGORY 2 show:

- poor organization, poor use of the space of the paper.
- lack of some essential part.
- extreme variation in size, i.e., less than 3" on typewriter paper
  - or extending over the edge of the paper.
- more than one figure drawn.
- slight overemphasis on sex detail.
- an extremely childish figure.

\(^8\)fig. 10, p. 102.
\(^9\)fig. 11, p. 103.
\(^{10}\)fig. 12, p. 104.
addition of slightly inappropriate detail, i.e., bar-bells, etc.
parts of the body showing through the clothes.

The figures in CATEGORY 1 show:

grotesque, non-human drawings.
figures in costume rather than every-day clothes, i.e., clown.
parts of the figure badly out of proportion to each other.
no body or no head.
addition of inappropriate detail, i.e., dagger, gun, blood.
over-emphasis on sex details.
excessive re-drawing, erasure, smudges in sex area. 12

Examples of these scoring categories are shown in the appendix, figures 10 through 20.

Because both the Bender-Gestalt and the Draw A Person Tests have been developed as measures of intellectual capacity for use with young children it was important to determine whether or not there was a close relationship between these tests and intellectual capacity when the subjects were of high school age. The group intelligence test used was the Differential Aptitude Tests. 13 The verbal reasoning and numerical ability subtest scores were combined and used as an approximation of the student's intellectual capacity.
The range of scores in this experimental group was from the first through the ninety-ninth percentile. Since the scores were in percentiles it was logical to assign the categories at twenty point intervals, i.e., category 5, those

11 fig. 13, p. 107; fig. 14, p. 108; fig. 15, p. 109; fig. 16, p. 110.
12 fig. 17, p. 111; fig. 18, p. 112; fig. 19, p. 113; fig. 20, p. 114.
scores between 81 and 100; 4, those between 61 and 80; 3, the scores between 41 and 60; 2, the scores between 21 and 40; and 1, the lowest, those scores between 1 and 20.

The relationship between the students' intellectual capacity and their scores on the Bender-Gestalt and Draw A Person Tests is shown in Table III, page 70, and Table VII, page 74.

One of the most widely used criterion measures used in determining a student's success in, or adaptation to, school is his grades. In the school used in this study final grades were given at the end of each semester. The grading system of the school was a five point scale with 1 representing the lowest grade and 5 representing the highest grade. The grades of all major subjects were averaged for each student, but each of the three semesters included in this study were kept separate. In studying the relationship between the Bender-Gestalt and the Draw A Person Tests and students' grades the third semester grades were used unless the student had dropped out of school or had been dismissed from school before the end of the third semester. In these cases where the third, or even the second semester grades were not available, the last final grade issued to the student was used. The relationship between the Bender-Gestalt Test and students' grades is shown in Table IV, page 71. The relationship between the Draw A Person Test and grades is shown in Table VIII, page 75.

Another widely used criterion measure of a student's adaptation to school is ratings by his teachers. This method has been criticized as being, for all practical purposes, the same judgment as grades, i.e., that if a student is rated low by a teacher on the various traits rated, he will also receive low
grades in the subject taught by that teacher. The relationship between teachers' ratings of students and the students' grades taught by those teachers is shown in Table XIV, page 81.

The last criterion measure used to determine a student's adaptation to school was his record in the discipline office. Some students never entered the discipline office while others were regular visitors. The discipline office maintained a file which showed the date, type of infraction of the rule, and the disposition of the case for each student that was sent to the office. While the offenses for which students were disciplined ranged from tardiness through insubordination, cutting classes, having unexcused absences and smoking, and the punishments ranged from extra study-period assignments for three days through being suspended or excluded from school, there were found to be certain "key points" that could be used in categorizing the data.

If a student had never been sent to the discipline office he was given a score of 5. The score 4 was assigned to those who had been sent to the office for minor infractions one, two or three times. A student who had been sent to the office more than three times, but who had not been suspended, nor his parents sent for was given the score of 3. However, if the parent had been sent for or if the student had been dropped from a major or a minor subject for discipline reasons, the score was 2. The lowest score, 1 was used only when a student was expelled from school or was obliged to transfer to the continuation school. The relationship of these ratings to the scores on the Bender-Gestalt and the Draw A Person Tests shown in Table VI, page 73 and Table X, page 77.
This chapter has discussed the procedures used in administering the tests. The methods used in categorizing the data was explained and the type of information compiled was outlined. The following chapter will show the results of the tests and discuss the results.
CHAPTER V

RESULTS AND DISCUSSION

In Chapter II the long developmental history of understanding of perception was traced. Many of the early physiologists and psychologists understood seeing only in its physical state, a retinal reaction, a photochemical excitation. But seeing is an experience. We have learned that no two people see the same things, even though their retinal states are identical. Their accounts of what they see differ, not because of differences in fundamental visual data, but rather, because of their interpretations of what has been seen. These interpretations are influenced by many things. They are influenced, as Murray\(^1\) has shown by the person's previous experience. Bender\(^2\) and Goodenough\(^3\) have demonstrated that the interpretation of a visual event is related to the maturational level of the individual experiencing the event.

Woodworth\(^4\) and others have shown the relationship between "set" and

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\(^2\)*A Visual Motor Gestalt Test and its Clinical Use.*

\(^3\)*Measurement of Intelligence by Drawings.*

\(^4\)*Reenforcement of Perception*, *Amer. J. Psychol.*, 1947, 60, 0. 119-124.
perception. Rorschach\textsuperscript{5}, Murray\textsuperscript{6}, Bruner\textsuperscript{7} and others have demonstrated that the personality dynamics of the person who is seeing affects the process of perceiving. Postman\textsuperscript{8}, Bruner\textsuperscript{9}, Witkin\textsuperscript{10} and others describe experiments designed to show that the life situation of a person, at the moment the perception occurs, influences, to a measurable degree, his perception.

Since perception is influenced so profoundly by personality and reflects a person's characteristic response to stress, a perceptual test should be the first choice when a tool is needed for the study of high school students and their adjustment to school. However, the perceptual tests ordinarily used to assess personality, The Rorschach, The Thematic Apperception Test, The Symonds\textsuperscript{1} Picture Story Test and others are tests requiring individual administration. This makes them unsuitable for wide use in a school setting because of the great amount of time they require for administration and interpretation. Moreover, these tests are dependent upon verbal skill and are, for this reason, not suited for use with individuals who have language difficulties or who have a foreign background. A perceptual test that would be adaptable to group

\textsuperscript{5}Psychodiagnostik.

\textsuperscript{6}Thematic Apperception Test.

\textsuperscript{7}Personality Dynamics and the Process of Perceiving.


\textsuperscript{10}Perception and Personality, A Symposium.
administration and to some type of non-verbal response is needed.

For many years the author had been using the Bender-Gestalt and the Draw A Person tests routinely in attempting to gain information and insight into the personalities of the young people she was counseling and testing in the schools. Naturally, these students were ones who, for a variety of reasons, were not adjusting well to the school and thus were referred to the psychologist. Their productions on the tests were, obviously, not representative samples of the work of the students in that school. They were such poor productions! Many protocols resembled those published by psychologists working with various clinical groups. The urge to study the protocols from an entire high school class became irresistible!

The class chosen for this study was a small, mid-year class of a large, public high school. Only those students who were freshmen for the first time were tested, ninety-two students. These students came from a very stable community. The Local Community Fact Book for Chicago showed that during the past ten years there had been only .3 percent change in the total population. The population of the area served by the school totaled forty-seven thousand, three hundred people. There were twenty-six negroes and thirty-nine people of "other" races in the area. There were fewer foreign born than there had been in the previous census, fourteen and a half percent fewer. Over ninety-three percent of the seven and one half thousand foreign born persons living in the area had been naturalized. The places of origin of the foreign born were, twenty-three percent from Germany, twenty-one percent from Sweden, six and one-half percent from Greece, five percent from U.S.S.R. and five percent from Ireland.
This community had over eighteen thousand people in it between the ages of twenty and forty-four years of age. About six and one-half percent of the population were of school age, five to nineteen years old. The median age of the residents was thirty-eight years. About two-thirds of the population were high school graduates, six percent had attended college, and about three percent had graduated from college.

Two-thirds of the employed people in the community were male, one-third female. About twenty-five percent of the people owned their own homes. For the most part the people were employed as clerks, craftsman foremen, operatives, professional and technical, managerial and official workers, sales and service workers, in that order. The major industrial classifications of their work were manufacturing, retail trades, professional, finance, insurance and real estate, wholesale trades, transportation and construction.

The average number of persons living in a regular household was three, the average number of persons per square mile was eighteen and a half.\textsuperscript{11}

From this information we can visualize a stable community whose citizens were well educated and regularly employed in white collar and manufacturing production jobs. The problems of the working mother, over-crowding and slum living were not pressing ones. Changing customs and morals may have been problems since a relatively high percentage of the foreign born people had come from northern European countries where family customs were strict.

In the class of ninety-two students, fifty-two percent were girls and forty-eight percent were boys (following percentages in this section may not total 100 since fractions of less than one-half were dropped). Their ages ranged from thirteen years through sixteen years. Three percent were thirteen years old, sixty-three percent were fourteen years old, twenty-eight percent were fifteen years old and five percent were over sixteen years old.

In order to show that the freshman class studied was similar in composition to other freshman classes in nearby schools, distributions of the students' age and sex have been made comparing the experimental school with three other schools. These distributions appear in Figure 21 and Figure 22, pages 115 and 116. The experimental school is shown as school one. School two and school three are neighboring public high schools. School four is a coeducational parochial high school in the same community.

The freshman class of school two was made up of forty-five percent boys and fifty-five percent girls. Four percent of the students were thirteen years old, sixty-six percent were fourteen years old, twenty-six percent were fifteen years old and four percent were over sixteen years old.

The freshman class of school three had forty-three percent boys and fifty-seven percent girls. Six percent of the students were thirteen years old, seventy-three percent were fourteen years old, seventeen percent were fifteen years old and three percent were over sixteen years old.

School four had forty-seven percent boys and fifty-three percent girls. Four percent of the freshmen were thirteen years old, eighty percent of them were fourteen years old, thirteen percent were fifteen years old, and three percent were over sixteen years old.
Protocols of the Bender-Gestalt and the Draw A Person tests were secured from the freshman in the three comparison schools. The protocols were judged and sorted using the categories, described in Chapter IV. Figures 23 and 24 found on pages 117 and 118, show the distributions of the protocols by categories for the experimental school and for the three comparison schools. School one, the experimental school, had the protocols of 12 percent of the students in the freshman class in category five, 15 percent in category four, 29 percent in category three, 26 percent in category two and 17 percent in category one, the lowest category of the Bender-Gestalt test.

In school two, 9 percent of the protocols were in category five, 27 percent in category four, 36 percent in category three, 22 percent in category two, and 6 percent in category one.

In school three, 12 percent of the protocols were in category five, 22.5 percent in category four, 32 percent in category three, 21.5 percent in category two, and 12 percent in category one.

In school four, 12 percent of the protocols were in category five, 24 percent in category four, 29.5 percent in category three, 22.5 percent in category two, and 11 percent in category one. These comparisons show that the students in the experimental school performed on the tests in a way similar to that of the students in the neighboring schools.

Figure 25, page 119, shows that the proportion of students who draw the opposite sex was similar in the four schools. Now we need to turn our attention to the meaning that can be read from test protocols.

In order to understand the dynamics of school adjustment we need to know
the factors, other than intelligence, that relate to school performance. Borens and Kaufman\textsuperscript{12} describe these factors as curiosity, appropriate aggressiveness, positive identification, appropriate skepticism, healthy masochism and ability to concentrate. While two of these factors, curiosity and appropriate skepticism are not easily read from the Bender-Gestalt and the Draw A Person protocols the other four are readily seen in them. To Borens and Kaufman's group of factors, one more should be added, ability to organize. While this factor may be thought to be a facet of intelligence, intelligent people who cannot organize their thoughts or their work are not uncommon. It is readily recognized that in a school setting this factor is important for a student's success in school.

In all of the following discussion it must be remembered that the drawings are not understood as being behavior equivalent, but, rather, characteristic for and symbolic of the types of behavior under discussion. The symbolism used is that which was generally used by Goodenough, Maehover, Rorschach, Beck, Bender, Murray and others listed in the bibliography. It formed the basis on which the scoring categories in this thesis were determined.

\textbf{APPROPRIATE AGGRESSIVENESS}

Borens and Kaufman define appropriate aggressiveness as, "...the freedom to expend energy in pursuit of school tasks, to grapple with problems, and to challenge unclear material until it is understood. This is closely related

to determination and persistence. A student who has this trait shows it in the two tests used by the strong, sure lines of his drawings. His figures are completed and of appropriate size. A student lacking this factor may leave his figures partly unfinished, his pencil lines may be sketchy or faintly drawn. His figures may be very small. A student who is overly aggressive may draw very large figures, his pencil lines may be heavy and black, there may be excessive "work-over" and re-drawing of parts of the figures. He may extend the lines of the figure beyond their usual limits. He may even draw one figure on top of another. Either the Bender-Gestalt or the Draw A Person test can be used to read these characteristics. Figure 10, page 104, is an example of a drawing showing appropriate aggressiveness. Figure 12, page 106, shows lack of appropriate aggressiveness, and Figure 27, page 120, shows an example of an overly aggressive student's drawing.

The student who lacks appropriate aggressiveness may fail in school because of his inability to complete his assignments, his habitual lateness in turning in his work, his lack of energy to solve the necessary problems or to understand the problems. The overly aggressive student may fail in school because of his difficulty in cooperating with his peers and his defiance of authority.

**POSITIVE IDENTIFICATION**

This factor is described by Borenz and Kaufman as "the desire to emulate important adult behavior, along with the need to please and be respected by

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significant people in the child's life. This factor is more easily seen in the Draw A Person Test than in the Bender-Gestalt. A positive feeling about one's self is shown when the figure drawn is of similar age, sex and social level as the person making the drawing as in Figure 28, page 121. A high school student who draws in the manner of a little boy of pre-school age may be too dependent to work his own math problems or to write his own themes, Figure 15, page 109. A girl who draws a boy may be pre-occupied with her feelings about her own sex role to the point of interference with her school work, as in Figure 32, page 125. A student who draws a clown or a comic strip hero may actually play the clown at inappropriate times and thus not adapt himself to school life, Figure 17, page 111. A fellow who draws a "strong man", as in Figure 14, page 108, may be so preoccupied with his manliness (or lack of it) or with his status within his own peer group that science experiments cannot hold his attention. The student who draws a "nothing" person with vacant face and empty eyes as in Figure 33, page 126, may be expressing his own feelings of complete inadequacy. Such a student may fail, not because he cannot do the assigned work, but because he feels unable to do the work and for this reason does not try. Or he may fail because his inner fantasy life is more real to him than his experience in the real world. Or, he may fail because of his inability to have positive feelings toward anyone, especially his teacher, and thus have no desire to emulate the teacher.

Figure 28, page 121, shows good acceptance of self and of own sex role. Figures 17, page 111, and 18, page 112, and 19, page 113, are examples of lack

14 Ibid.
of positive identification in high school students. Figure 29, page 122, drawn by boys, suggests lack of positive sex identity, perhaps to the point of interfering with their peer relationships.

HEALTHY MASOCHISM

Borens and Kaufman define this term as, "meant to indicate the capacity for the child to tolerate frustration. It also implies the ability to endure the relative discomfort of concentrating on a disagreeable (or boring) task in order to achieve a goal of value.... It can be a painful process to gradually develop sufficient self-discipline...to be able to attend to a learning situation.... It is characterized by learning to avoid distractions, to focus on tasks and to postpone immediate pleasure for future gain."\(^{15}\)

In both the Bender-Gestalt and the Draw A Person tests this characteristic can be seen in the amount of control exercised in making the drawings. In the Bender-Gestalt the correct number of dots are used in making a figure. Lines do not extend beyond their limits. The figures are completed, yet unnecessary, inappropriate additions are avoided. The work is neat and orderly. Figure 1, page 95, is an example of healthy masochism in the Bender-Gestalt Test. Figure 10, page 104, shows this quality in the Draw A Person Test.

Masochism may be expressed to a rather unhealthy degree by stiff, rigid drawings, Figure 12, page 106, by excessive "work-over", Figure 29, page 122.

A lack of an appropriate degree of healthy masochism may be shown in the Bender-Gestalt Test by perseveration of a figure, i.e., the figure is repeated over and over, indicating a lack of the inhibitory process, or the repetition may be carried over from one figure into the next as in Figure 7, page 101.

\(^{15}\)Ibid.
The figure may be copied in a manner requiring less labor than if it were copied accurately, i.e., a line substituted for a series of dots, Figure 3, page 97, or the words "12 dots" written on the paper instead of copying the dots as directed. Parts of the figure may be omitted, as in Figure 3, page 102. The drawings may be extremely large ones requiring less control and less concentration than would ones in proportion to the space of the paper, Figure 5, page 99. The figures may be enclosed in lines, as in Figure 6, page 100.

In some cases these indications signify negativism. However, negativism is usually coupled with signs of over-aggressiveness as in Figure 7, page 101, while absence of healthy masochism appears as carelessness, as in Figure 3, page 97.

In the Draw A Person Test, absence of healthy masochism may be seen in the "potato man", Figure 30, page 123, which is a labor-saving type of drawing. In many cases, the unfinished drawing, Figure 13, page 107, may be a labor saving device. In repeating a drawing over and over, Figure 13, the student is showing inability to inhibit the impulse for repetition. In the drawing in which the body shows through the clothes he shows his inability to inhibit distracting ideas, Figure 16, page 110. Figure 15, page 109, shows the overly large drawing characteristic of many students who have difficulty in limiting their own behavior and exercising appropriate self management.

ABILITY TO CONCENTRATE

Borenz and Kaufman discuss the factors which result in continuing interference with attention, grouping them into the following categories: unmet basic needs, unresolved inner conflicts, and brain damage. They define unmet
basic needs as:

the child's preoccupation with intense feelings of not being accepted. It also implies a low self-concept or a desire to regress to an earlier more comfortable developmental period. Such children lack the motivation for success; in other words, they have personal problems to solve which are so important to them that they cannot participate in the learning process. Unresolved inner conflicts can also exist to the extent that concentration is affected. In most instances, the child is not aware of the nature of these feelings and they seldom become readily apparent to adults...inner conflicts can arise out of sibling rivalry...comfortable acceptance of his sexual identity, etc....The third group of factors interfering with ability to concentrate is brain damage. This is not readily detectible except in its severe forms....Such a child can be indistinguishable from the restless, easily distractible, somewhat impulsive child caused by other conditions.16

We have shown examples of "comfortable acceptance of own sexual identity" in discussing the topic of positive identification. Another example of unmet basic need in high school students is that for affection. Need for affection can be read from the Draw A Person or the Bender-Gestalt tests in a way similar to the Rorschach "texture" responses. Beck has this to say about texture responses. "As observations of them accumulate, and are validated against setting of whole personality structure in which they occur, the inference is warranted that they stem in the first instance from erotic needs; and in the secondarily from unsatisfied fulfillment of such needs in the person's developmental years with, thirdly, resulting personality conflict or disturbances. The response may be a lead thus to 'affect hunger'."17

In human figure drawings texture is most readily shown in drawing the hair. Machover says, "emphasis upon wavy, glamorous cascading hair, when

16Ibid., p. 403.

combined with other outstanding cosmetic details, is seen in drawings of sexually delinquent girls or those who entertain glamour aspirations. This would correspond to Beck's first instance, erotic need. In her discussion of shading Machover says: "any degree or type of shading is considered an expression of anxiety." This would correspond to Beck's third instance, personality conflict or disturbance.

In the Bender-Gestalt Test retracing of lines, or work-over, is interpreted as shading, Figure 9, page 103. In some cases actual shading (scored as addition of inappropriate detail) is added to the design as in Figure 8, page 102. The first is usually understood as representing an aggressive type of response to personality conflict while the second appears as a clue to seriously unsatisfied erotic needs.

There is more opportunity for students to use shading in the Draw A Person Test. Over emphasis on cascading hair suggests affect hunger which could lead to sexual delinquency or to early marriage, neither conducive to good adjustment to high school. Beards, sideburns and exaggerated hair styles on the boys' figures carry the same suggestion of unsatisfied erotic needs, Figure 19, page 113. Excessive shading of the outline of the body, or of various parts of the body suggest anxiety, Figure 31, page 124. Controlled shading, i.e., shading that is rationalized as stripes or patterns in the fabric of the clothing suggest that the inner conflict is being managed by the student through intellectual means, Figure 17, page 111. However this type of shading is sometimes seen accompanied by indications of extremely poor

18 Personality Projection in the Drawing of the Human Figure, p. 353.
19 Ibid., p. 98.
adjustment, in this case, poor identification, indicating that intellectualization of conflict may not be a sufficient defense if the conflict is serious, Figure 19, page 113.

Another example of inability to concentrate, probably arising from unresolved inner conflict, combines starting and restarting the test with excessive shading, Figure 34, page 127.

Other examples of inability to concentrate, probably arising from unresolved inner conflict, are demonstrated in the Bender-Gestalt protocols in which the figures are formed by using numbers, letters, or stars, in those having the shape of the design distorted or an extra row added as in Figure 8, page 102. Addition of inappropriate details suggest a breaking through of fantasy, perhaps caused by intense inner conflicts. Students making such designs, see Figure 8, page 102, are the ones who say, "I don't get it" when a teacher has just explained something that the class easily understood.

Brain damage is listed by Borenz and Kaufman as a third factor interfering with ability to concentrate. The Bender-Gestalt Test was used by Nulman and Vatovee in an attempt to differentiate between organic and functional brain damage. They reported a "surprising heterogeneity of skill" in the two groups using the Bender Test, and concluded that the test did not differentiate between them. For our purpose of assessing school adjustment it does not matter whether the etiology of brain damage is organic or functional. It is not even necessary for a student's intellectual ability (as measured by an intelligence test) to have been impaired. If his brain damage prevents him

---

from focusing on his studies, if his impulsiveness leads him into serious conflicts with authority, if his distractibility makes his behavior disruptive in the classroom he is not adapting to high school.

The Bender-Gestalt Test reflects the students' inability to concentrate and suggests brain difficulty in designs in which the parts are separated as in Figure 5, page 99, in designs that show tremor, as in Figure 6, page 100, and in designs in which the Gestalt is destroyed, as in Figure 7, page 101.

ABILITY TO ORGANIZE

The factor that should be added to the group of factors described by Borens and Kaufman as being related to school performance is the ability to organize. This factor is understood to be an important facet of intelligence. Beck quotes Rorschach as saying "an optimum of these abilities (organisation drive) is a further component of intelligence". However, most intelligence tests are not designed to measure this factor directly. On the other hand the Bender-Gestalt Test is designed to test organization ability. Bender quotes Koffka as saying, "the first principle (in Gestalt theory) is the relationship of the figure to its background. The background may be looked upon as a part of the Gestalt. A disturbance in orientation (may be understood) as a disturbance in the most fundamental principle in Gestalten".

A student's designs may show an inability to organize by being rotated on the background, i.e., a horizontal design drawn in a vertical position, as in Figure 5, page 99. His inability may be demonstrated by the whole protocol being drawn in a completely disorganized way, Figure 4, page 98. Or, one or

21 Rorschach Test I Basic Processes, p. 58
22 A Visual Motor Gestalt Test and Its Clinical Use, p. 94.
more designs may be drawn in such a way that they overlap each other, as in Figure 8, page 102. Finally, the parts of a design may be widely separated, as in Figure 8, page 102. While some of these drawings suggest brain damage, others suggest confusion arising from other sources. All of them indicate the student's lack of ability to organize his material.

It will have been noted that there was considerable overlapping of the factors described. In an actual personality these factors are non-separable from the others, they are only separated in this discussion for the purposes of description and illustration.

The absence of further examples does not imply that the possibilities have been exhausted. Other test uses will be suggested in the next chapter.

The next question to be discussed is whether the scores on the two tests showed any relationship to the criterion measures used for determining the students' school adjustment. Since much of the data analyzed was categorical data the chi square test of significance of association between the classifications, used $r \times s$ contingency tables. The model shown in Table I on page 68 was used as a means of testing differences among groups of students having different scores on the criterion measures, and also, the association among certain attributes.

A score of five, using any of the measures, is the highest possible score. A score of one is the lowest score. The $X^2$ (i.e., the obtained chi square) was computed, following Mayo's model, as shown in Tables I and II, pages 68 and 69. The degrees of freedom were computed by the usual formula $(r-1)(c-1)$.

---

**TABLE I**

**MAYO'S SYMBOLISM FOR R X S CONTINGENCY TABLE**

<table>
<thead>
<tr>
<th></th>
<th>j = 1</th>
<th>2</th>
<th>j</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>i = 1</td>
<td>n_{11}</td>
<td>n_{12}</td>
<td>n_{1j}</td>
<td>n_{1s}</td>
</tr>
<tr>
<td>2</td>
<td>n_{21}</td>
<td>n_{22}</td>
<td>n_{2j}</td>
<td>n_{2s}</td>
</tr>
</tbody>
</table>

---

A

<table>
<thead>
<tr>
<th></th>
<th>j = 1</th>
<th>2</th>
<th>j</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>n_{i1}</td>
<td>n_{i2}</td>
<td>n_{ij}</td>
<td>n_{is}</td>
</tr>
</tbody>
</table>

---

r

<table>
<thead>
<tr>
<th></th>
<th>j = 1</th>
<th>2</th>
<th>j</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>n_{r1}</td>
<td>n_{r2}</td>
<td>n_{rj}</td>
<td>n_{rs}</td>
</tr>
</tbody>
</table>

---

\[
\begin{align*}
 n_{1} & = \sum_{j} n_{ij} \\
 n_{.j} & = \sum_{i} n_{ij} \\
 n & = \sum_{i} \sum_{j} n_{ij} \\
\end{align*}
\]

Fig. 2. Representation of Symbolism for r x s Contingency Table where

- A & B refer to the attributes by which the attributes are classified
- r denotes the number of rows
- s denotes the number of columns
- i denotes any row number from 1 to r
- j denotes any column number from 1 to s
- n_{ij} denotes the cell frequency common to the ith row and the jth column
- n_{i.} = \sum_{j} n_{ij} is the total frequency for the ith row
- n_{.j} = \sum_{i} n_{ij} is the total frequency for the jth column
- n = \sum_{i} \sum_{j} n_{ij} denotes the total frequency for the table
TABLE II

ILLUSTRATIVE 5 x 5 CONTINGENCY TABLE USING MAYO'S MODEL

<table>
<thead>
<tr>
<th>Teacher's Ratings</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>.3</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>22</td>
<td>23</td>
<td>14</td>
<td>11</td>
<td>91</td>
</tr>
</tbody>
</table>

The following shows the systematic computation of the chi square. The steps in procedure have been given in some detail for illustrative purposes. Some steps could be eliminated when using automatic calculators.

\[
\begin{align*}
\chi^2 &= 91 \times (0.422245) = 38.424295 \\
\text{df} &= 16 \\
P &< .01
\end{align*}
\]

Table E in Guilford's new third edition of Fundamental Statistics in Psychology and Education was used for determining the significance of \( \chi^2 \).
Bender's original use of the Bender-Gestalt Test was that of a developmental scale. She found that children continued to improve their ability to copy the designs until eleven years of age. The scores of the freshman students on the Bender-Gestalt Test were compared with their scores on the Differential Aptitude Tests by means of the 5 x 5 contingency tables, shown in Table III below. The $X^2$ was found to be 28.37 with 16 degrees of freedom, which is significant at the .05 level.

**TABLE III**  
CONTINGENCY TABLE FOR BENDER-GESTALT TEST AND DIFFERENTIAL APTITUDE TESTS

<table>
<thead>
<tr>
<th>D.A.T.</th>
<th>Bender-Gestalt Test</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>20</td>
</tr>
</tbody>
</table>

$X^2 = 28.37$

df = 16

$p < .05$

The Chi Square for the Bender-Gestalt Test and Differential Aptitude Tests was found to be significant at the .05 level and we may reject the null hypothesis of no difference in the Bender-Gestalt Test scores between the group of students who scored high on Differential Aptitude Tests and those who scored low.

---

25* *A Visual Motor Gestalt Test and Its Clinical Use, p. 135.*
 Assuming that a student's intelligence has a great deal to do with his total adjustment to the high school situation, grades are considered next. It is commonly known that some intelligent students have made low grades. The relationship between students' Bender-Gestalt scores and their grades, computed by the contingency table has a $X^2$ of 37.82 with 16 degrees of freedom. This was significant at the .01 level, which permits us to reject the null hypothesis that there is no difference in the Bender-Gestalt Test scores between the group of students who received high grades and those that received low grades in high school. Table IV below shows the relationship.

**TABLE IV**

CONTINGENCY TABLE FOR BENDER-GESTALT TEST AND STUDENTS' GRADES

<table>
<thead>
<tr>
<th>Students' Grades</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>14</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>5</td>
<td>13</td>
<td>6</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>23</td>
<td>26</td>
<td>74</td>
<td>11</td>
<td>89</td>
</tr>
</tbody>
</table>

$x^2 = 37.82$

$df = 16$

$p < .01$
The relationship between students' Bender-Gestalt scores and the rating of them made by their classroom teachers was computed using the contingency tables. The $\chi^2$ was somewhat larger than that for grades, 38.42 with sixteen degrees of freedom, significant at the .01 level. This permits us to reject the null hypothesis of no difference in the Bender-Gestalt Test scores between the group of students who received low ratings by their teachers and the group that received high ratings. Table V below shows the relationship.

TABLE V

CONTINGENCY TABLE FOR BENDER-GESTALT TEST AND TEACHERS' RATINGS

<table>
<thead>
<tr>
<th>Teachers' Ratings</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>22</td>
<td>28</td>
<td>14</td>
<td>16</td>
<td>91</td>
</tr>
</tbody>
</table>

$\chi^2 = 38.42$
$df = 16$
$p < .01$
A student might possibly have fairly low native ability, yet make passing grades and receive an average or better rating from his teachers. He would be considered to be making a good adjustment to school. But any student, whether of high or of low intelligence who gets into serious difficulty with authority, either in school or in the community and consequently has many sessions in the discipline office, he cannot be thought to be adjusting well to the school situation. The records of the discipline office showed that 74% of the students of the freshman class being studied were never called into the discipline office.

**TABLE VI**

**CONTINGENCY TABLE FOR BENDER-GESTALT TEST AND DISCIPLINE SCORES**

<table>
<thead>
<tr>
<th>Discipline Scores</th>
<th>Bender-Gestalt Test</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>22</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 38.94 \]

**df = 16**

\[ p < .01 \]

The relationship between the scores for the Bender-Gestalt Test and discipline scores was computed by means of a contingency table. The \( \chi^2 \) was 38.94
with sixteen degrees of freedom and was significant at the .01 level. The null hypothesis that there is no difference in the Bender-Gestalt Test scores between the group of students who were never in the discipline office and the group that were frequently subjected to disciplinary action is rejected. See Table VI, page 73.

Similar contingency tables were made and the $X^2$ computed for the same criterion measure determining the relationship to the Draw A Person Test. The $X^2$ with 16 degrees of freedom, found to be 21.24 for the Draw A Person Test and students' intelligence was not significant at the .05 level. The table is below.

**TABLE VII**

CONTINGENCY TABLE FOR DRAW A PERSON TEST
AND DIFFERENTIAL APTITUDE TEST

<table>
<thead>
<tr>
<th>D.A.T.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>14</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>30</td>
<td>15</td>
<td>21</td>
<td>14</td>
<td>91</td>
</tr>
</tbody>
</table>

$x^2 = 21.24$
$df = 16$
$p > .05$
Chi square for the relationship between the Draw A Person Test and students' grades was 34.42, significant at the .01 level.

**TABLE VIII**

CONTINGENCY TABLE FOR DRAW A PERSON TEST AND STUDENTS' GRADES

<table>
<thead>
<tr>
<th>Students' Grades</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>13</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>28</td>
<td>16</td>
<td>20</td>
<td>14</td>
<td>89</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 34.42 \]

\[ df = 16 \]

\[ p < .01 \]
The $\chi^2$ for the Draw A Person Test and teachers' ratings of their students was significant at the .05 level.

**TABLE IX**

CONTINGENCY TABLE FOR DRAW A PERSON TEST AND TEACHERS' RATINGS

<table>
<thead>
<tr>
<th>Teachers' Ratings</th>
<th>Draw A Person Test</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>30</td>
</tr>
</tbody>
</table>

$\chi^2 = 29.52$

$df = 16$

$p < .05$
The $\chi^2$ for the Draw A Person Test and the discipline scores were not significant at the .05 level.

**TABLE X**

CONTINGENCY TABLE FOR DRAW A PERSON TEST AND DISCIPLINE SCORES

<table>
<thead>
<tr>
<th>Discipline Scores</th>
<th>Draw A Person Test</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>30</td>
</tr>
</tbody>
</table>

$\chi^2 = 24.29$

$df = 16$

$p > .05$

Thus, in spite of the differences in usability in locating the factors contributing to students' adjustment to school, the Bender-Gestalt Test has greater overall significance than does the Draw A Person Test. Yet each test permitted us to reject the null hypothesis of no difference between groups for some variables.
The relationship between the Bender-Gestalt Test and the Draw A Person Test was computed by means of a contingency table and the $X^2$ was found to be 57.06, with 16 degrees of freedom, significant at the .001 level. We can, without question reject the null hypothesis of no difference between scores on the two tests. This contingency table is shown below.

**TABLE XI**

**CONTINGENCY TABLE FOR BENDER-GESTALT TEST AND DRAW A PERSON TEST**

<table>
<thead>
<tr>
<th>Draw A Person Test</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>8</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>24</td>
<td>27</td>
<td>14</td>
<td>11</td>
<td>92</td>
</tr>
</tbody>
</table>

$X^2 = 57.06$

$df = 16$

$p < .001$

Another way of showing that the Bender-Gestalt Test has a somewhat greater significance than the Draw A Person Test is to group the students who earned low scores on any criterion measure and to compare them with students who received high scores on all of the criterion measures. Scores five, four and three were categorized as adjusted, scores one and two as non-adjusted.
The information was cast into a five by two contingency table with degrees of freedom \((2-1) \times (5-1) = 4\). The Bender-Gestalt Test scores for the students who were adjusted to school were compared with the Bender-Gestalt Test Scores of the students who were not adjusted to school. The computed \(X^2\) was 14.26 with four degrees of freedom, significant at the .01 level. The results are shown in Table XII.

**TABLE XII**

CONTINGENCY TABLE FOR STUDENTS ADJUSTED TO SCHOOL AND BENDER-GESTALT TEST

<table>
<thead>
<tr>
<th>Bender-Gestalt Test</th>
<th>Students Adjusted to School</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Adjusted</td>
<td>Adjusted</td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>36</td>
</tr>
</tbody>
</table>

\(X^2 = 14.26\)

\(df = 4\)

\(p < .01\)
A similar comparison was made using the Draw A Person Test scores. The $X^2$ was 11.17 with 4 degrees of freedom, significant at the .05 level. The results are shown in Table XIII.

**TABLE XIII**

CONTINGENCY TABLE FOR STUDENTS ADJUSTED TO SCHOOL AND DRAW A PERSON TEST

<table>
<thead>
<tr>
<th>Draw A Person Test</th>
<th>Students Adjusted to School</th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Adjusted</td>
<td>Adjusted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>10</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>5</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>12</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>9</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>37</strong></td>
<td><strong>92</strong></td>
<td></td>
</tr>
</tbody>
</table>

$x^2 = 11.17$

$df = 4$

$p < .05$

There have been many studies of teachers' ratings of students. It is interesting to note that for the freshman students in the high school under discussion the relationship between the ratings given the students by their teachers and the grades earned under these teachers was very high. This relationship is shown in Table XIV. The $X^2$ was 99.16 degrees of freedom which is significant at the .001 level.
TABLE XIV

CONTINGENCY TABLE FOR TEACHERS' RATINGS OF STUDENTS AND STUDENTS' GRADES

<table>
<thead>
<tr>
<th>Students' Grades</th>
<th>Teachers' Ratings of Students</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>20</td>
</tr>
</tbody>
</table>

\[ x^2 = 99.16 \]
\[ df = 16 \]
\[ p < .001 \]

The second problem that we were concerned with was whether or not the scoring method was communicable. Could other people get results similar to those of the author when using the scoring method? Englehart's adaptation of Ebel's analysis of variance method shown in Appendix V, pages 128 and 129, was used in estimating the reliability of the ratings made by the different judges. The reliability of the average ratings using the Bender-Gestalt test was .80 and for the Draw A Person test was .93, see Table XIV, A, B, pages 82 and 83.

---

TABLE XV
ANALYSIS OF VARIANCE ESTIMATES OF RELIABILITY OF RATERS

A. Bender Gestalt Test

<table>
<thead>
<tr>
<th>Raters</th>
<th>.x1</th>
<th>.x2</th>
<th>.x3</th>
<th>.x4</th>
<th>.x5</th>
<th>.x6</th>
<th>.x7</th>
<th>.x8</th>
<th>.x9</th>
<th>.x10</th>
<th>Sum</th>
<th>Sum²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>25</td>
<td>625</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>24</td>
<td>576</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>21</td>
<td>441</td>
</tr>
<tr>
<td>Sum</td>
<td>5</td>
<td>12</td>
<td>11</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>70</td>
<td>4900</td>
</tr>
<tr>
<td>Sum²</td>
<td>25</td>
<td>144</td>
<td>121</td>
<td>64</td>
<td>49</td>
<td>36</td>
<td>9</td>
<td>36</td>
<td>81</td>
<td>9</td>
<td>574</td>
<td>194</td>
</tr>
</tbody>
</table>

Analysis of Variance

<table>
<thead>
<tr>
<th>d.f.</th>
<th>Sums of Squares</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>2</td>
<td>1652 - 4900 (= \frac{.89}{10} \times 3 )</td>
</tr>
<tr>
<td>Tests</td>
<td>9</td>
<td>574 - 4900 (= \frac{28}{10} \times 3 )</td>
</tr>
<tr>
<td>Error</td>
<td>18</td>
<td>30.67 - .97 - 28 = 1.70 (= \frac{.093}{10} \times 3 )</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>194 - 4900 (= \frac{30.67}{10} \times 3 )</td>
</tr>
</tbody>
</table>

Average reliability of ratings \( r_{tt} = \frac{.485 - .093}{.485 \div (10-1) \times .093} = .296 \)

Reliability of Average rating \( r_{tt} = \frac{.485 - .093}{.485} = .308 \)
### TABLE XV (Cont.)

ANALYSIS OF VARIANCE ESTIMATES OF RELIABILITY OF RATERS

#### B. Draw A Person Test

<table>
<thead>
<tr>
<th></th>
<th>Individuals</th>
<th>( x_1 )</th>
<th>( x_2 )</th>
<th>( x_3 )</th>
<th>( x_4 )</th>
<th>( x_5 )</th>
<th>( x_6 )</th>
<th>( x_7 )</th>
<th>( x_8 )</th>
<th>( x_9 )</th>
<th>( x_{10} )</th>
<th>Sum</th>
<th>Sum²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>35</td>
<td>1296</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>34</td>
<td>1156</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>31</td>
<td>961</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
<td>13</td>
<td>13</td>
<td>12</td>
<td>7</td>
<td>9</td>
<td>15</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>100</td>
<td>3413</td>
</tr>
<tr>
<td>Sum²</td>
<td></td>
<td>169</td>
<td>169</td>
<td>144</td>
<td>49</td>
<td>81</td>
<td>225</td>
<td>100</td>
<td>36</td>
<td>16</td>
<td>81</td>
<td>1070</td>
<td>10000</td>
</tr>
</tbody>
</table>

#### Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>d.f.</th>
<th>Sums of Squares</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>2</td>
<td>( \frac{3413}{10} - \frac{10000}{10x3} = 7.97 ) (( s_r ))</td>
<td>3.98</td>
</tr>
<tr>
<td>Tests</td>
<td>9</td>
<td>( \frac{1070}{3} - \frac{10000}{10x3} = 23.33 ) (( s_e ))</td>
<td>2.59</td>
</tr>
<tr>
<td>Error</td>
<td>18</td>
<td>26.67 - 7.97 - 23.33 = -4.63 (( s_e ))</td>
<td>-.257</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>( \frac{360}{10x3} - \frac{10000}{10x3} = 26.67 ) (( s_t ))</td>
<td></td>
</tr>
</tbody>
</table>

Average reliability of ratings

\[
r_{tt} = \frac{3.98 - (-0.257)}{3.98^2 - 1 - 2.57} = 0.59
\]

Reliability of Average Rating

\[
\frac{2.98 - 0.257}{3.98} = 0.93
\]
In this chapter the students in the experimental group were discussed. The community from which they came was described. It was shown that the students were similar to those in neighboring schools, both public and private. A frame of reference for understanding the dynamics of school adjustment was presented. It was shown by many examples how different behavioral factors could be read in a symbolic way in the Bender-Gestalt and the Draw A Person protocols. The relationship between the criterion measures and the test scores as measured by $X^2$ were found to be significant, for the most part. The relationship for each test and each criterion measure was shown. The $X^2$ for a pooled estimate of adjustment and each test was shown to be significant. Teachers' ratings and students' grades were shown to have a close relationship. The reliability of the judges' ratings was found to be satisfactory.
CHAPTER VI

SUMMARY AND IMPLICATIONS

In the early development of psychological theory perception was understood as a mechanical process and psychologists were chiefly concerned with the transmission of nerve impulses, in establishing the location of brain centers, and in learning the limits of stimulation required to produce a sensation. When the fact of individual differences became known these differences were viewed simply as variations in the speed of transmission of the nerve impulse rather than as anything more complex. There were, also, from time to time, psychologists, particularly those of a philosophical nature, who held that the mind could conceive only of ideas and thus the mechanistic approach of their fellows was in error.

Contemporary theory makes various attempts to allow for the active and interactive characteristics of perception. Acknowledging that a simple motor theory would be inadequate to explain the projective aspects of perception and to allow for the dynamic part the personality of the perceiver takes in molding a perception, modern theorists have attempted to accommodate these aspects of perception in complicated and interesting ways. They have attempted to include motivation in their theory building. They have tried to differentiate between sensation and perception - and perception from conception. The task is not finished, and there is not, as yet, agreement among the theorists about the nature of perception.

In this thesis perception is understood as an individual experience,
subjective in nature and sensitive to modification by emotional states, the conditioning of past experience, and the fluctuations of attention, but dependent of course, on the limits of the organism having the perception. It is held that the whole idea of perception is a most complex experience, not a mere sensation produced by a stimulus. If perception is thought of as consisting of patterns of nerve impulses, and if responses to these impulses form groups of behavioral acts, then the patterns of persons' responses may be studied and finally understood.

The idea that samples of responses made by individuals to a standard situation can be analysed and used to predict the behavior of the individuals is not a new one. However, it is believed that the method of using the particular tests chosen, for the purpose of predicting adjustment to high school for the newly enrolled students, has been developed in a systematic way for the first time in this thesis.

Because both of the tests and some of the criterion measures yielded scores that were classificatory in nature, non-parametric statistical treatment of the data was required. Using five by five contingency tables, chi squares were calculated and probabilities were determined which permitted the null hypothesis to be rejected in the following instances. The null hypothesis of no difference in the Bender Gestalt Test scores between the group of students who scored high and the group who scored low was rejected for these measures: Differential Aptitude Tests, at the .05 level; grades, at the .01 level; teachers' ratings, at the .01 level; discipline records, at the .01 level. Similar contingency tables and probabilities permitted rejection of the null hypothesis of no difference in the Draw A Person Test scores between
the group of students who scored high and the group who scored low on these measures: grades, at the .01 level, teachers' ratings, at the .05 level. The chi squares and their probabilities did not permit rejection of the null hypothesis concerning the Draw A Person Test and the Differential Aptitude Tests nor the Draw A Person Test and the discipline records. There was found to be a high degree of agreement between the Draw A Person Test and the Bender Gestalt Test when used in the way described in this thesis.

There was evidence offered to show that the experimental freshman class of the high school studied was similar to freshman classes of other schools, both public and private, in the same neighborhood. This does not imply, however, that the findings would be similar for schools in a radically different community. Data gathered at a girls' correctional institution suggests that there is a significant difference between the test scores earned by the girls in the institution and by the girls in a high school. This data shows that the method of administering and scoring the tests is applicable to groups having quite divergent backgrounds.

The agreement between judges was found to be satisfactory. A rationale for the dynamics of school adjustment was presented and the relationship between the factors described and the characteristics of the two tests was discussed.

Even though there was considerable agreement between the two tests as shown by the $X^2$ of 57.06, with df = 16 and $p < .001$, it is felt that the tests are of greater value if used together than if used separately. The Bender Gestalt is a highly structured test and yields a sample of the students' work when he is given specific directions. The Draw A Person is unstructured and
thus yields a sample of the students' behavior when he has to decide how to proceed for himself.

The primary implication of this study is that there is an administrative tool available which makes it possible to discover personality and behavior difficulties of students in an objective way at the very beginning of their high school careers, at least in schools having a similar population to those investigated. Further study would be required to determine the proportions of students' protocols falling into the different categories in schools which draw their students from radically different backgrounds than the one described here. It is possible that students from a less stable neighborhood would produce protocols more easily read and sorted than the examples given here. It is possible that a wider latitude of acceptable, (or at least tolerated) behavior exists in schools in less stable neighborhoods than in the schools studied. The present study provides a point of reference in examining other schools.

It would be most interesting to study the adaptation of students to their school in a situation where one group of students who scored low on the two tests was assigned to teachers who give strong leadership and definite directions and another group who also scored low was assigned to teachers who were especially permissive in their teaching methods.

Another type of research that is greatly needed is to determine the degree of seriousness of students' problems that can be adequately handled by the resources existing in the school. At the present time, about five percent of the students of a school are absorbing the time and energy of the attendance
officer, the discipline officer and the psychologist, as well as a dispro-
portionate share of the time and energy of the classroom teacher. Who among
this five percent are responding positively to the remedial measures at the
disposal of the school? Is it the hostile, aggressive student, the confused
student, the student who cannot bring a task to completion? Is it the student
who thinks so little of himself that he cannot try, or the one who cannot face
stress without clownering?

The technique described in this thesis could be used with profit in study-
ing "dropouts" among the students. It is possible that students who drop out
of school produce protocols having characteristic patterns. If these patterns
could be discovered, the possibility of preventive measures is increased.

Are the test protocols of students who belong to clubs and participate in
activities similar to those who do not? Are there patterns to be discovered
in the protocols of the "under achievers", i.e. those students who are not
working up to the level of their intellectual ability? Do gifted students
who are in accelerated classes or programs score differently on the tests
than do gifted children who remain in the regular school program?

One of the frustrations of psychologists who do counseling is the lack of
measurable evidence of progress on the part of the counselees. Both parties
may feel that considerable progress has been made, but both would welcome some
kind of an objective evaluation. Experience has shown that the two tests can
be used for evaluating progress in counseling and that behavioral and attitud-
inal changes are reflected in the protocols. There have been too few cases
studied in this way to permit statistical treatment. Bender\(^1\) reported that

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\(^1\)A Visual Motor Gestalt Test and Its Clinical Use, Chap. VIII.
mature patients who were recovering from "physiological insult", i.e. any kind of severe shock or injury to the brain, went through the same sequence, as shown in the Bender Gestalt protocols, as did normally maturing children. There has not yet been enough experience in using the tests to evaluate change in a counseling situation to allow more to be said than that changes, either for better or for worse, are reflected in the test protocols and that repeated administration of the tests offers no technical difficulty.

This chapter has summarized the findings of the study and has suggested other possible uses of the two tests and other needed research made possible by group administration and the quick sorting scoring method described in the dissertation.

It is apparent that a tool is needed which will identify for administrators and counselors the potentially disturbed pupil so that he may be assisted in his adjustment. With early detection and application of therapeutic measures, the student should enjoy a more profitable high school career, prove less disrupting in the classroom, and demand less administrative and counseling time. Because the tests, the Bender Gestalt highly structured with specific directions and the Draw A Person unstructured and requiring initiative, tap divergent aspects of personality it is felt that the two tests are of greater value when used together than when used separately. With a broader sampling of the population of high school students, including students from different socio-economic groups, from different parts of the country and from the various minority groups, and with careful standardization, this technique of using the projective tests promises to be useful in discovering personality and behavior difficulties of students and for predicting students' adjustment to the high school situation.
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UNPUBLISHED

APPENDIX I

EXAMPLES OF THE SCORING CATEGORIES OF THE BENDER GESTALT TEST

Figures show good organization and use of the available space of the paper, good proportion, one part to another, one figure to another, proper shape, dots are dots, loops are loops, proper slant.

FIGURE 1
EXAMPLE OF CATEGORY 5, BENDER GESTALT TEST
Figures show some lack of organization but use of the available space of the paper; fair proportion, one part to another; variation in size from one figure to another; variation in shape.

FIGURE 2
EXAMPLES OF CATEGORY 4, BENDER GESTALT TEST
Limited use of the space of the paper, all figures along side, top or bottom.

Variation in proportion of parts of figure or of one figure to another.

Some substitution of line for dots or loops or of loops for dots.

Minor extension of lines beyond the limits of a figure.

Slight retracing of lines, "work-over".

Poor angulation, poor juxtapositioning, but Gestalt maintained.

Use of guide lines.

FIGURE 3
EXAMPLES OF CATEGORY 3, HENDER GESTALT TEST
Disorganization of the figures on the paper.

FIGURE 4

EXAMPLES OF CATEGORY 2, BENDER GESTALT TEST
Rotation of a figure on the paper.

Figures excessively large, excessively small or both.

Some separation of the parts of a figure.

FIGURE 5
EXAMPLES OF CATEGORY 2, BENDER GESTALT TEST
Poor curvature, break in curve. Very poor angulation.

Great extension of the lines of the figure beyond its limits.

Figures separated by lines or enclosed in lines. Tremor.

**Figure 6**

*Examples of Category 2, Bender Gestalt Test*
Figures completely disorganized on the paper. Confusion.

Great perseveration carried from one figure to another, or within the same figure.

Retracing of lines to the point of digging into the paper, excessive work-over.

Gestalt destroyed

FIGURE 7

EXAMPLES OF CATEGORY 1, BENDER GESTALT TEST
Figure formed by using numbers, letters, stars, etc.

One figure overlapping another figure.

Parts of a figure badly separated.

Parts of a figure omitted.

Shape of figure distorted, or an extra row added.

Addition of inappropriate detail.

FIGURE 8

EXAMPLES OF CATEGORY I, BENDER GESSELL TEST
Figures in confusion on the paper. Excessive "work-over".

FIGURE 9

EXAMPLE OF CATEGORY 1, BENDER GESTALT TEST
APPENDIX II

EXAMPLES OF THE SCORING CATEGORIES OF THE DRAW A PERSON TEST

Figure well organized, in proportion, shows movement.

FIGURE 10

EXAMPLE OF CATEGORY 5, DRAW A PERSON TEST
Figures are in proportion, have all essential parts; little movement, there are faults in proportions, little or no detail.

FIGURE 11

EXAMPLES OF CATEGORY 4, DRAW A PERSON THAT
Figures are stick figures out of proportion, AND no movement, AND no detail.

FIGURE 12

EXAMPLES OF CATEGORY 3, DRAW A PERSON TEST
More than one figure.

Figure does not have all essential parts.

Figure less than 3" on typewriter size paper.

Figure 13

Examples of Category 2, ERAX A PERSON TEST
Figures are poorly organized, space of the paper used poorly. Slight overemphasis on sex detail.

Extremely childish figure.

FIGURE 14

EXAMPLES OF CATEGORY 2, DRAW A PERSON TEST

108
Figure is poorly organized, space of paper used poorly. Extremely childish figure.

**Figure 15**

**Example of Category 2, Draw a Person Test**
Figures are poorly organized, space of the paper used poorly.
Slightly inappropriate added detail, flag.
Parts of the body showing through the clothes.

FIGURE 16

EXAMPLES OF CATEGORY 2, DRAW A PERSON TEST
Figure 17

Examples of Category 1, Draw a Person Test
Parts of the figure are badly out of proportion to each other.

Figure has no body.

FIGURE 18

EXAMPLES OF CATEGORY 1, DRAW A PERSON TEST
Inappropriate added detail, dagger, gun, blood, etc.

FIGURE 19
EXAMPLES OF CATEGORY 1: DRAW A PERSON TEST
Over-emphasis on sex detail. Excessive re-drawing, erasure, smudges.

FIGURE 20

EXAMPLES OF THE CATEGORY 1 ON DRAW A PERSON TEST
APPENDIX III

DISTRIBUTION OF STUDENTS IN FOUR SCHOOLS

FIGURE 21

DISTRIBUTION OF STUDENTS' AGES
FIGURE 22

DISTRIBUTIONS OF SEX OF STUDENTS
DISTRIBUTION OF BENDER GESTALT PROTOCOLS BY CATEGORIES
FIGURE 24

DISTRIBUTION OF DRAW A PERSON PROTOCOLS BY CATEGORIES
FIGURE 25

DISTRIBUTION OF STUDENTS WHO DREW OPPOSITE SEX
APPENDIX IV

EXAMPLES OF PERSONALITY FACTORS REFLECTED IN STUDENTS' DRAWINGS

FIGURE 27
OVER AGGRESSIVENESS SHOWN IN DRAW A PERSON

120
FIGURE 28

ACCEPTANCE OF SELF AND OWN SEX ROLE
FIGURE 29
LACK OF POSITIVE SEX IDENTIFICATION

122
FIGURE 31
EXCESSIVE SHADING
124
FIGURE 33
A "NOTHING" FIGURE
Inability to complete task.

Shading rationalized as "grass". Symbolism in the sign.

FIGURE 34

A COMPLICATED EXAMPLE
APPENDIX V

TABLE XVI

ENGLEHART'S ADAPTATION OF EBEL'S
METHOD OF ESTIMATING THE RELIABILITY OF RATINGS

TRYON'S DATA AND ANALYSIS OF VARIANCE ESTIMATES OF RELIABILITY

<table>
<thead>
<tr>
<th></th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>Sum</th>
<th>Sum²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>25</td>
<td>625</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>43</td>
<td>1349</td>
</tr>
</tbody>
</table>

| etc.  |
| 10    |

<table>
<thead>
<tr>
<th></th>
<th>Sum</th>
<th>69</th>
<th>63</th>
<th>43</th>
<th>38</th>
<th>32</th>
<th>245</th>
<th>7403</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sum²</td>
<td>4761</td>
<td>3969</td>
<td>1849</td>
<td>1444</td>
<td>1024</td>
<td>13047</td>
<td>1719</td>
</tr>
</tbody>
</table>

\[ \text{Sum}^2 = 60025 \]

\[ \text{Var} = \frac{60025}{17} = 1719 \]
### TABLE XVI (Continued)

**ENGLEHART'S ADAPTATION OF EBEL'S METHOD OF ESTIMATING THE RELIABILITY OF RATINGS**

#### B. Analysis of Variance

<table>
<thead>
<tr>
<th>d.f.</th>
<th>Sums of Squares</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>9</td>
<td>$\frac{7403 - 60025}{5} = \frac{280.10}{5} = 280.10 (s^2_I)$</td>
</tr>
<tr>
<td>Tests</td>
<td>4</td>
<td>$\frac{13047 - 60025}{5} = \frac{104.20}{5} = 104.20 (s^2_e)$</td>
</tr>
<tr>
<td>Error</td>
<td>36</td>
<td>$518.50 - 280.10 - 104.20 = 134.20 (s^2_e)$</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>$1719 - 60025 = \frac{518.50}{5} = 518.50 (s^2_t)$</td>
</tr>
</tbody>
</table>

**Average reliability of tests (or ratings)**

$$r_{tt} = \frac{31.12 - 3.73}{31.12 (5 - 1)} = 0.595.$$  

**Reliability of average ratings or total scores**

$$r_{tt} = \frac{31.12 - 3.73}{31.12} = 0.880.$$
The dissertation submitted by Virginia Muller has been read and approved by five members of the Department of Education.

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

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

__________________________
Signature of Adviser