ASSESSING ACADEMIC ACHIEVEMENT WITH SPECIFIC VARIABLES OF THE DRAWING COMPLETION TEST IN CERTAIN SUB-SAHARAN TRIBAL GROUPS: A PILOT STUDY

Thesis for the Degree of Ph. D.

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John P. Keith

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This is to certify that the

thesis entitled

ASSESSING ACADEMIC ACHIEVEMENT WITH SPECIFIC VARIABLES OF THE DRAWING COMPLETION TEST IN CERTAIN SUB-SAHARAN TRIBAL GROUPS: A PILOT STUDY

presented by

John P. Keith

has been accepted towards fulfillment of the requirements for

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ABSTRACT

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by John P. Keith

THE PROBLEM

This study was concerned with ascertaining the value of the Drawing Completion Test for assessing academic achievement by the drawing formations of low achieving and high achieving children in the Central African Federation, the Republic of South Africa and the British Protectorate of Swaziland. Specifically the study attempted to test three hypotheses which stated that in contrast to the high achieving children the low achieving children would:

1. Fail to integrate the stimuli, given on the test blank, in their finished drawings.
2. Show a marked repetition of simple graphic themes in each of their eight drawings.
3. They will tend to "burst the frame" or disregard the spacial divisions of the test.

THE SAMPLE

The sample consisted of 96 school children from rural African schools in the Central African Federation, the Republic of South Africa and the British Protectorate of Swaziland. The chronological age of all children tested was approximately 11 years. However, it was impossible to accurately determine their ages because birth certificates

are not always available, and the teacher's estimate of the subjects age had to be used for determining chronological age.

PROCEDURE AND METHODOLOGY

Scores were obtained for all the subjects on each of the following variables:

1. The degree of integration of the stimuli given in the test blank, in the finished drawings.
2. The number of repetitions of simple graphic themes in each of the drawings.
3. The extent to which the spatial divisions of the test were ignored.

Statistical analysis of the relationship between the mean scores of the high and low achieving students for each of the variables were investigated by means of the "t" test of means, which tests also indicated the degrees of significant differences.

RESULTS

1. Integration of Stimuli. On all samples from each of the three cultural groups, integration of stimuli in the drawings contributed significantly to a differentiation between the mean scores of the high and low achieving children.
2. Repetition of Drawing Themes. Only the Zulu sample from the Republic of South Africa provided a significant difference between the means of the high and low achieving groups on the repetition of drawing themes.

3. Bursting the Frame. Only the Central African Federation sample provided a significant difference between the means of the high and low achieving groups on those drawings which ignored the spatial divisions of the test.

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by

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Dedicated to

My Wife

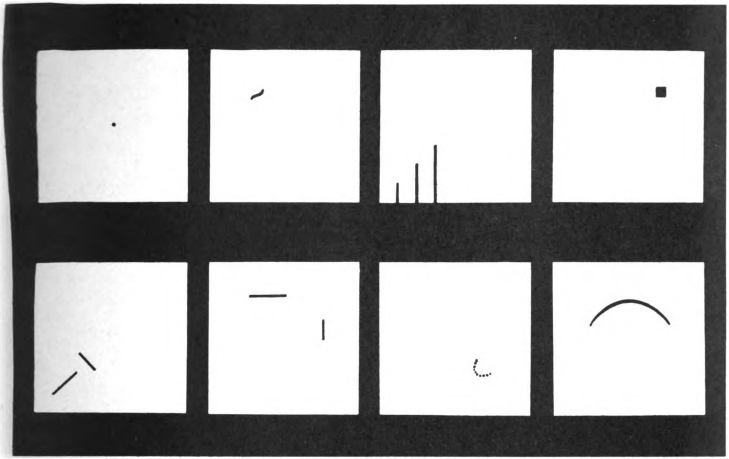
Ruth

TABLE OF CONTENTS

LIST OF TABLES

List of Tables (cont.)

LIST OF FIGURES



INTRODUCTION

Recently there has emerged a renewed interest in finding a workable intelligence test to be used in underdeveloped, multi-language areas such as Africa. In the past, efforts to use current Western verbal type tests have not met with success in these countries primarily because of the language and culture barriers which would require norming a verbal test for each language group.

As part of this growing emphasis there has arisen a renewed interest in the use of drawings as expressions of personality. A major stimulus for this interest has come from a drawing test originally developed by Gestalt psychologists, F. Kruger and F. Sander, of the University of Leipsig. This drawing test, called a phantasie test, was similar to the present Drawing Completion Test and presented a certain number of irregular lines which were to be used by the subjects in their drawings. Sander hypothesized that the subjects drawings reflected the subject's characteristic structural traits. Results of his subsequent studies verified his hypothesis and broad differences were noted in the subjects drawings (22:3).

Sander's successful experiments led to further experimentation by one of his colleagues at the University of Leipsig, Ehrig Wartegg. As a result of his investigations he developed The Drawing Completion Test as it appears in its present form (25:4, 2[illegible]:4). Further research with Wartegg's Drawing Completion Test, undertaken at the University of Louvain led to the publishing in 1952 of a book by Kinget entitled: The Drawing Completion Test: A Projective Technique for the Investigation of Personality (15). This book reports the results of Kinget's

work which was done exclusively with adult subjects in an attempt to validate the test as a device to measure personality. Her work also included an estimation of the intelligence of the subjects tested.

The Drawing Completion Test is composed of eight squares, framed in heavy black borders designed to make the characteristics of each stimuli show forth to best advantage. Each square contains stimuli, described by Kinget as having the following properties:

> Stimulus 1, the dot, has the characteristics of smallness, lightness, roundness, centrality. In itself this stimulus is unimposing and could easily be overlooked by the less perceptive or less sensitive subject. However, its exact central position lends it an importance which retains the attention and calls for acknowledgement. Thus a tension arises between imagination and thinking, for the material insignificance of this stimulus must be combined with its functional importance in order to result in adequate completion.
>
> Stimulus 2, the wavy line, suggests something lively, mobile, loose, fluttering, growing or flowing. The qualities of this stimulus decidedly resist matter of fact treatment or technical use and require integration into something organic or dynamic.
>
> Stimulus 3, the three vertical regularly increasing lines, express the qualities of rigidity, austerity,

regularity, order and progression. These qualities may blend and produce complex impressions of dynamic organization, gradual development, methodical construction and similar concepts.

Stimulus 4, the black square, appears heavy, solid, massive, angular and static and evokes concrete materiality. While stimulus 3, in spite of its mechanical character, still shows something growing and dynamic, stimulus 4 is completely inorganic and inert. It also has a somber appearance, conducive to associations of a somewhat depressive or, in rare cases, threatening character.

Stimulus 5, the two opposed slanting lines, expresses predominantly the idea of conflict and dynamism. The position of the longer line evokes something directed decidedly upwards, to which the shorter line shows frank opposition. The rigidity of the lines and their perpendicular relation also suggests construction or technical use.

Stimulus 6, the horizontal and vertical lines, has a strictly matter of fact, sober, rigid, dull and uninspiring aspect. At first sight it seems fit only for completion into simple geometric patterns or elementary objects. Experience shows, however, that

this stimulus may be worked into a variety of interesting combinations. However, the off-center position of each of the lines makes their completion into a balanced whole a tough task requiring considerable planning activity.

Stimulus 7, the dotted half circle, suggests something very fine, delicate, round and supple, that is at the same time appealing and a little puzzling because of its complex bead-like structure. This structured like aspect of the stimulus, together with its somewhat awkward location within the square, forces the selective activity of the mind and resists casual or crude treatment.

Stimulus 8, the broadly curved line, has the organic qualities of roundness and flexibility of stimulus 7, but whereas 7 has something irritating in its complexity and smallness, stimulus 8 appears restful, large, fluent, and easy to deal with. Its smooth curve readily suggests completion into organic subject matter, animate or inanimate, while its downward bending movement and location connote the idea of cover, shelter and protection. Its relatively large dimension also evokes expansion and vastness as proved by the frequent completion of this stimulus into natural phenomena such as rainbows or sunsets (15:35-37).

The description of the stimuli by Kinget had value primarily with the development of The Drawing Completion Test as a diagnostic tool for the measurement of personality. However, Kinget did include in her interpretation an estimation of the intellectual level of her subjects. The following factors entered into her estimation of the subjects intelligence (15:99-117).

1. Predominance of organization over detail.
2. Degree and level of organization are significant... This is especially true for drawings showing linear three-dimensional relationships.
3. Symbolism and abstraction, provided it is in keeping with the stimuli, indicates intellectual achievement. Abundance of symbolic content occurs only with subjects who show an excessively metaphysical orientation, or with pseudo-thinkers who like to indulge in obscure and sterile speculations.
4. Movement: Kinget distinguishes between explicit and implicit movement. Explicit movement is that which is actually indicated in the functioning of the object or person depicted. Implicit movement is suggested by the vivid, sharply oriented position of the person or object. Children's drawings show more explicit than implicit movement. Drawings of movement are considered a sign of superior intelligence.
5. Originality.
6. Time.

Statement of the Problem

It is the purpose of this study to attempt to ascertain the value of the Drawing Completion Test for assessing academic achievement by the drawing formations of low achieving and high achieving children in the Central African Federation, the Republic of South Africa and the British Protectorate of Swaziland. (A simultaneous study by Kenneth Matheny will be made to gain further evidence concerning the validity of this instrument in measuring intelligence among the United States public school population (18).)

Present research (9:242-248, 17:446-450) shows that over 2,000 Drawing Completion Tests have been given to children in non-primitive societies. This research indicated that there were differentiating characteristics found in the drawing formations of low achieving and high achieving children of the same culture. The characteristics were: (1) Low achieving children failed to integrate the starting design elements given on the test blank in their drawings, (2) They showed marked repetition of simple graphic themes in their drawings, and (3) They tended to "burst the frame" or disregard the spacial divisions of the test.

Taking into account that over 2,000 Drawing Completion Tests have been given to children and that certain distinctive characteristics were noted in the drawing formations of low achieving children, it is hypothesized that, in contrast to the drawing formations of high achieving children in a developing society, low achieving children in the same society will manifest distinctive characteristics in their drawings.

Specifically, it is hypothesized that low achieving children in the Central African Federation in the Republic of South Africa and the British Protectorate of Swaziland will:

1. Fail to integrate the stimuli, given on the test blank, in their finished drawings.
2. Show a marked repetition of simple graphic themes in each of their drawings.
3. They will tend to "burst the frame" or disregard the spacial divisions of the test.

Definitions

Due to the percentage system of class grading in primary school systems in the three countries under consideration, the following definitions of mentally retarded and gifted will be adopted for the purposes of this study.

Low achieving students will be those students whose academic grade level, as assessed by the class teacher and class records, is not higher than the 30th percentile.

High achieving students will be those students whose academic grade level, as assessed by the class teacher and class records, is not lower than the 70th percentile.

Need for the Study

During the last decade there has been an increasing trend among the newly emerging countries of Africa to take rapid strides toward the mass education of all primary age school children, and as a result an increasing percentage of the national budget is being spent on education.

A current statistical report published in Her Majesties Command Paper #1149, 1960 (11), indicates that out of 45,000 African children in Northern Rhodesian Province of the Central African Federation enrolling for their first years schooling, 2,500 fail to advance to the second year in school. In the 1959 issue of Adult Education, Guy Hunter (12:183-208) reports that of 180,000 African children enrolling for their first years schooling in the Central African Federation, only between 4,000 to 6,000 will reach the eighth year of school and that about only two-thirds of this number will successfully complete the eighth year Government examinations. The financial burden of supporting this primary education program will, it is hypothesized, prove to be too heavy for these countries to handle and at the same time not jeopardize their fiscal stability. If the present mass primary education policy is followed and if the present drop-out trend continues, it has been variously estimated (1) that it will take at least 20 years for the newly emergent countries to fill their minimum manpower needs. This estimate of manpower needs, although based on Nigerian statistics, is not dissimilar to the manpower needs in the other Sub-Saharan countries.

The Conference of African States on the Development of Education in Africa which met at Addis Ababa in 1961 (2) made suggestions which were to deal with the financial and manpower need problems faced by participants of that conference. The suggestions were:

1. Member countries were to refrain from building more primary education schools and to concentrate on the development of secondary schools.
2. Member countries were to concentrate efforts of their aid on students in secondary schools.

It was hoped that when this program is fully operative the manpower needs will be substantially reduced.

An instrument is needed which will differentiate between low achievers and high achievers so as to enable education authorities to project future secondary education enrollment and facility needs. Since language barriers in the Central African Federation prohibit the wide use of various verbal intelligence scales, it is hypothesized that The Drawing Completion Test could become a useful instrument in identifying those high achievers in primary classes who are able to meet the academic requirements for secondary education. It is further hypothesized that the same test will identify those low achieving students who will not be able to perform successfully in secondary school and who can then be channeled into various vocational training schools and thus lower the drop-out rate in primary schools.

Limitations of the Study

The limitations of the study consist primarily of:

1. The automatic passing system used in the countries considered in this study. Under this system all children are automatically advanced from one school standard (grade) to the next, thus creating a minimum of differentiation between low achievers and high achievers.
2. The inability of teachers adequately to assign student grades. The fact that over 80% of the national teachers (18, 19) have received less than eight years of schooling supports the contention that teachers do not have sufficient training to adequately assign grades to their students.
3. The lack of a local culture-oriented curriculum. For most African students the study of Greek, Latin, mathematics, ancient European history, English literature, has no meaning related to the students cultural environment, with the result that many students are not sufficiently motivated to attain their highest academic potential.
4. The lack of other intelligence tests by which low achievers and high achievers can be differentiated.
5. The number of the subjects tested. The sample of 98 is large enough to warrant the statistical tools involved in this study. However, inferences drawn

from this size sample will as a result be limited. The sample used is fairly representative of the rural African schools in the Central African Federation, the Republic of South Africa and the British Protectorate of Swaziland.

6. The fact that the study does not seek to establish age norms for the scoring of African children's drawings.
7. Only certain variables of the scoring system indicated by Kinget will be used.

Organization of the Thesis

This thesis is organized according to the following plan:

Chapter I serves not only as an introduction to the problem, but also as an introduction to the test instrument used in this study.

Chapter II is a summarization of the most significant research related to this study. The research has been divided into two major divisions: (1) Research related to drawings as intellectual measurements. (2) Research related to drawing tests in Africa.

Chapter III is concerned with the procedure and methodology of this study. It describes: (1) The test and methods employed in its administration. (2) The sample. (3) Concludes with an explanation of the statistical procedures used in the analysis of the data obtained in the study.

Chapter IV consists of a presentation of tables and the results of the study.

Chapter V presents a summary of the results with conclusions and recommendations.

CHAPTER II

RESEARCH RELATED TO DRAWINGS AS INTELLECTUAL MEASUREMENTS

Interest in childrens drawings as a means of mental measurement goes back as early as 1885 when Cooke (7:1) published an article describing the stages of intellectual development as shown in childrens drawings. Successively, articles published about the drawings of children appeared in various publications. Among the best known of these early writers were Corrado Ricci, Perez, Baldwin, Lukens, Maitland, and Gotze (10:1-4). The authors did not give statistical tables to substantiate their findings; however, their findings do provide evidence on the intellectual development of children.

During the period from 1900 to 1915 a move was organized by Lamprecht (16:2) of Leipsig to compile childrens drawings from all over the world. This collection included drawings from primitive African races. However, since the investigation was never completed, no adequate summary of the compiled data is available. Goodenough reports that possibly the most extensive study of childrens drawings was made by Kerschensteiner (14:4), who reorganized the course of study in drawing for the Munich school system. Over 100,000 drawings were made and these were eventually classified under three headings:

1. Purely schematic drawings. These correspond to the idioplastic stage (a stage where the child draws what he knows rather than what he sees).
2. Drawing according to visual appearance.

3. A still later stage in which the child attempts to give an impression of three-dimensional space.

In his book, Kerschensteiner(14:4) devotes several pages to an account of the drawings of high and low achieving children. He contrasts these drawings with those of normal children and notes that the differences are both qualitative and quantitative. He found that low achieving children tend to produce drawings which are more primitive than those of normal children. Kerschensteiner's contention in this instance is backed up by Cyril Burt (5:5) who maintains that it is possible to differentiate between the drawings of normal and low achieving children by this characteristic alone.

A study by Rouma (21:5) indicated some of the differences between the drawings of mentally retarded children and younger-normal children. The following special differences were noted:

The spontaneous drawings of subnormal children show:

1. A marked tendency to automatism.
2. Slowness in the evolution from stage to stage.
3. Frequent retrogression to an inferior stage.
4. There are numerous manifestations of the flight of ideas. The drawings....are not finished, and they have to do with a number of very disparate subjects.
5. Certain drawings by subnormal children, taken singly, are very complete; but when we examine them more closely we find that the child has confined himself to a series of sketches which have evolved slowly....

6. Many subnormal children show a great anxiety to represent an idea in its totality, or to reproduce all the details of a given sketch....
7. Subnormal children prefer those drawings in which the same movement recurs (21:7).

Rouma also conducted other experiments which consisted of comparing the drawings of European children and those of modern primitive societies. The children in primitive societies had spent several months in a mission school and had had ample opportunity to use paper and pencil. The result of this comparative experiment justified the following conclusions:

1. In young children a close relationship is apparent between concept development as shown in drawing, and general intelligence.
2. Drawing, to the child, is primarily a language, a form of expression, rather than a means of creative beauty.
3. In the beginning the child draws what he knows rather than what he sees....
4. ....the child exaggerates the size of items which seem interesting or important; other parts are minimized or omitted.
5. The order of development in drawing is remarkably constant, even among children of very different social antecedents. The reports of investigators the world over show very close agreement, both as regards the

method of indicating the separate items in a drawing and the order in which they appear.

6. The earliest drawings made by children consist entirely of what may be described as a graphic enumeration of items. Ideas of number, or relative proportion of parts, and spatial relationships are much later in developing.
7. In drawing objects placed before them, young children pay little or no attention to the model.
8. Drawings made by subnormal children resemble those of younger normal children in their lack of detail and in their defective sense of proportion. They often show qualitative differences....not infrequently the same drawing will be found to combine very primitive with rather mature characteristics.
9. Children of inferior mental ability sometimes copy well, but they rarely do good original work in drawing. Conversely, the child who shows real creative ability in art is likely to rank high in general mental ability (21:5).

In 1926, Florence Goodenough published a book entitled: Measurement of Intelligence by Drawings (10). It was her intention to determine experimentally if an objective scoring system could be devised that could successfully measure intelligence as evidenced by drawings. The results of her experiment led to the development of the "Draw a Man" test. Her scoring system, developed after four preliminary scoring

systems were tried and discarded, resulted in the broad division of the drawings into two classes: (1) Those in which the drawings could not be recognized as a human figure, and (2) Those which were recognizable as such. Goodenough standardized her test on 3,593 subjects. Her conclusions were as follows:

1. The probable error of estimate of an I.Q. is approximately 5.4 points at all ages from five to ten years....
2. Partial correlation treatment shows that the test makes a significant contribution to a prognosis of school success....
3. The average correlation with Stanford-Binet mental age is .763 for ages four to twelve taken separately....
4. Artistic ability is practically a negligible factor at these ages.... (10:48-50)

In the more recent literature concerned with drawings as measures of intelligence, the tests devised have proved to be either extensions or revisions of older drawing tests. One exception to this trend, however, is The Drawing Completion Test, which has been rather thoroughly described in the preceding chapter.

Current research on The Drawing Completion Test is being carried on in various parts of the world. The test is being used in European circles as a diagnostic instrument (2:52-55) with several articles having appeared in professional journals reporting certain characteristics which appear to indicate degrees of intellectual development in children. Among these articles is one by Erna Duhm (9:242-246) which reported

on the performance of 1,502 subjects. Her samples were divided into groups of younger children, older low achieving children, adolescents and adults. Dubm found that low achieving children tended to ignore the starting stimuli in three ways: (1) By not filling in signs, (2) By over-drawing without consideration of the spacial divisions, and (3) By ignoring completely the starting stimuli in their drawing. Lykke Saur (2:52-55) reported that he also found characteristics which indicated degrees of intellectual development in children. He found that on a limited population of patients in a children's clinic, The Drawing Completion Test could be used to identify diagnostic categories, one of which was mental deficiency. In still another study, Hanno Muller-Suur (17:446-450) reported that the Wartegg Drawing Completion Test indicated differential characteristics in a sample which consisted of 50 feeble minded, 50 senile dementias, 100 epileptics and 200 schizophrenics. His findings indicated all sample other than the schizophrenics failed to integrate the starting sign in their drawings. He further noted that these drawings showed marked repetition of themes drawn.

One interesting study with this test was conducted by Martti Takala and Marjotta Kaikkarainen (23) in Finland reported that the drawings of 1,027 subjects representing 17 occupations were studied. The results indicated that the test differentiated occupational groups and could serve as a possible predictor of vocational success.

S. Biesheuval (3, 4:101-103), the Director of the National Institute for Personnel Research in Johannesburg, South Africa, has included in his book, Psychological Tests (3), a review of non-verbal tests. Included in his review are comments on African attitudes to the testing situation, factors dealing with temperament, school education, genetic capacity, nutrition, parental care, parental intelligence and environment. A comprehensive summary of Biesheuval's review is given here because of its pertinence to the test instrument used in this study.

Biesheuval suggests that psychological tests will be increasingly used among Africans in the next few years. They will play an important role both in shaping the immediate future of Africans and in facilitating their transition from a rural to a more diversified occupational life. He maintains that tests will be used for two major purposes:

1. To determine the educational potentialities within an industrialized cultural context, and
2. To determine their occupational fitness in an industrialized economy. (3)

Due to the multi-cultural aspects amongst Africans, it is important to eliminate, as far as possible, specific cultural associations in any tests. Biesheuval considers that in order to eliminate these specific cultural associations the following variables must be controlled:

1. Complete familiarity with any given language.

2. Knowledge and habits acquired by specific type of scholastic education, and
3. Knowledge and habits acquired by living within a given socio-economic context. (3)

Of the three above mentioned variables which must be controlled in any given test situation, the language factor is the easiest to control, by the elimination of all verbal materials. In the case of the second variable, that of knowledge and habits acquired by a specific type of scholastic education, experience showed that tests which presented problems through the medium of pictorial materials familiar to a particular culture, were considered to be valid for inter-cultural comparisons. The third variable is extremely difficult to control. Cultural associations go far deeper than the intellectual habits acquired by school education. They affect the entire approach to and interpretation of the perceptual world. Biesheuval further points out that the use of paper and pencil tests tend to be valid only in the higher school grades due to the unfamiliarity of African students with these materials. Due to economic reasons, the majority of African school children use slates in their school work.

Pictorial Tests: Many researchers have resorted to the use of pictorial tests not only because of the multi-language problem, but also because the proper cultural note could be introduced. Biesheuval (3) points out that a picture type test, particularly if it was printed on paper, is a highly conventional symbol, which the child in the Western culture has learned to interpret, largely because of his

association with pictures from childhood. The reverse of this situation is true with African children. Therefore, picture tests are virtually meaningless if the pictorial representation does not evoke the attitude of interpretation which the European control group automatically assumes. To substantiate his point, Biesheuval constructed a mechanical-aptitude test which required candidates to assemble a model cocopan (a mining tool with which all the candidates were familiar). To guide them in their task, they were provided with a photograph of the model in which the relationship of the parts was distinctly shown. None of the candidates was able to assemble the parts by means of the photographic guide. The candidates appeared not able to associate parts with the pictorial counterpart. The candidates, however, were able to put the parts together without the use of the photographic guide. In this instance they appeared to be able to reason which part went where.

Non-representational Drawings: Biesheuval (3) states that Africans who have become adept with the use of paper and pencils nevertheless have difficulty in integrating starting designs or stimuli with their drawings. This may be due in part to a limited scholastic background, or perhaps it is due to the mode of presentation on paper. Biesheuval suggests that more fundamental factors may be involved. In his opinion, Africans tend to see their artistic designs as part of the object decorated and not as entities by themselves. Their art designs are constructed piece at a time, yet the decorator apparently sees the pattern as a whole in relation to the object decorated.

Spatial Relationships: A cultural factor which must be recognized in the drawings of Africans is one of spatial relationships (3). In contrast to the European culture where orientation to the vertical-horizontal axis is an accepted feature of daily life, e.g., rectangularity of buildings, windows, books, writing paper; the African cultures tend to create objects in rounds. Tests, whether drawing or otherwise, which assume spatial relationship common to the European culture, place the African at a distinct disadvantage. Even if he does comprehend what is required of him in a test, he will be slower in his mental manipulations because of unfamiliar spatial divisions.

Commenting on pictorial and drawing tests as a whole, Biesheuval states that spoken and written languages involve symbolism of a much higher level than pictorial representations. He maintains that Africans are great linguists, they appear to have little difficulty in acquiring several languages. The majority of Africans can converse in two or three African dialects. In addition to this, school children learn to speak English and in most higher grades will master some Latin as well. It is his opinion that pictorial and drawing tests give only impressionistic evidence of the thought processes of the Africans and no evidence at all to indicate whether its origins are genetic or cultural.

Biesheuval concludes that it is currently impractical to control the factors which influence intelligence test performance in the various inter-racial groups in Africa. He states:

> "The necessary degree of control cannot be exercised because, in respect of certain essentials, conditions of life in the groups to be compared are too divergent.

> Unless they have been subjected to similar cultural influences, for the same length of time, no basis for quantitative comparison exists. The very thing to be compared assumes different manifestations in different cultures, giving scope for qualitative comparisons only....
>
> "Perfect control of these factors would probably mean the elimination of all that is significant in the abilities of the people and the measurement of functions possessing little educational or occupational value.
>
> "In view of the differences in socio-economic status.... it is equally difficult to control the nutritional, parental, and home-environmental factors known to have an influence on the development of genetic potentialities." (3)

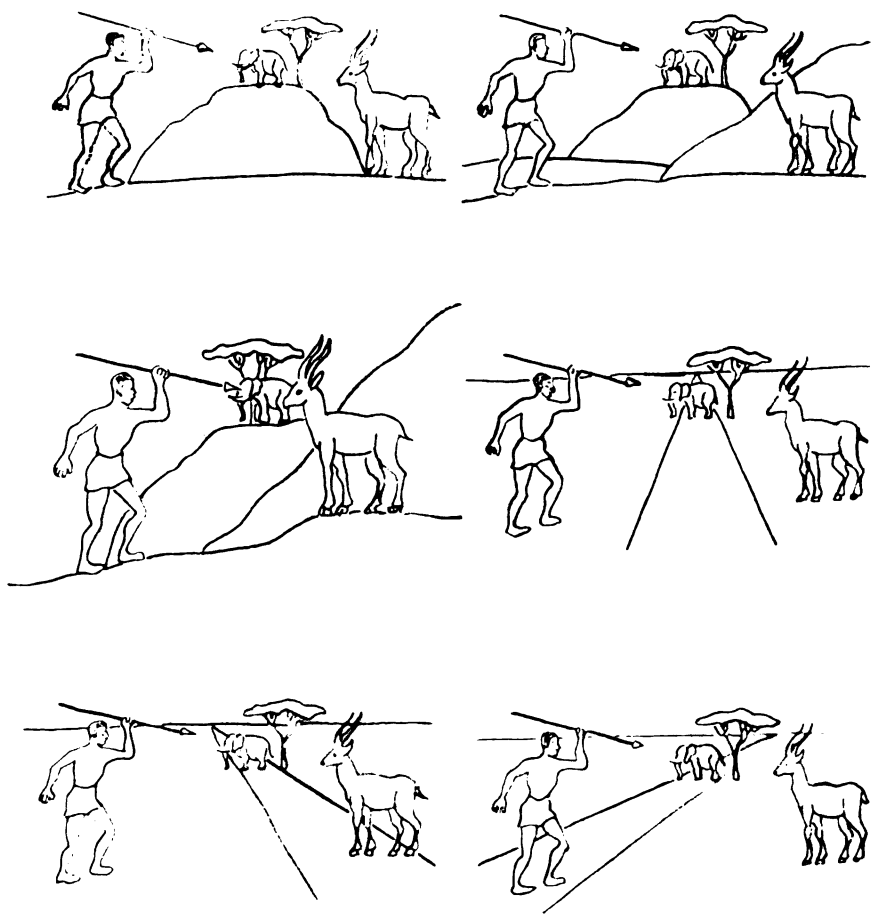
A study by Hudson (12:183-208) of pictorial depth perception was conducted in 1960 among various sub-cultural groups in Africa. The study consisted of analyzing the responses in such a manner as to provide self-evident two-dimensional and three-dimensional responses (see Tables II and III). The test was composed of eleven outline pictures. The first six were designed to test horizontal space perception while the last five were designed to test vertical space perception.

The sample group consisted of eleven samples which were selected from two categories: (1) A school attending group which was composed

of three European South Africans and three Africans and (2) A non-school group which was composed of Africans from the Union of South Africa, Southwest Africa, Northern Rhodesia, Southern Rhodesia, Angolia, and Mozambique.

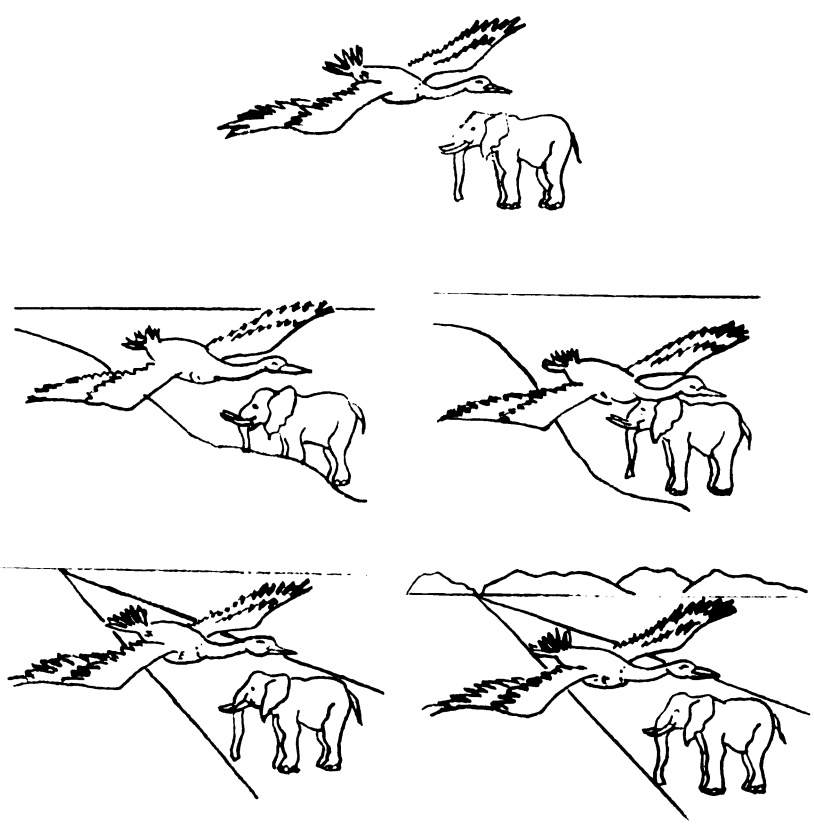
The findings of the study revealed that the school group saw the test objects predominantly three-dimensionally and the non-school group saw the test objects almost entirely two-dimensionally. From this result it was hypothesized that three-dimensional perception on the part of Africans was acquired through a learning process, and that there were cultural factors which determined two or three-dimensional perception in Africans, as a result, dimensionality was not scored for in this study.

FIGURE II



Horizontal Pictorial Space Perception Test

FIGURE III



Vertical Pictorial Space Perception Test

CHAPTER III

METHODOLOGY

Administration: Due to financial limitations it was not feasible for the writer to go to Africa to personally supervise the testing of the school children involved. Fortunately, the writer's father, who has spent over 25 years in the administration of mission schools in the three areas where these tests were conducted, was able to personally administer the tests to the Swazi and Zulu tribal groups. In the case of the Central African Federation tribal group, the services of the Education Officer for Mission Schools in the Central African Federation were secured and he administered the tests to the students in that area.

The School Sample: The purpose of this study was to ascertain the value of The Drawing Completion Test for indicating academic achievement by the drawing formations of low achievers and high achievers in rural African schools located in various African tribal groups. In order to obtain a representative sample of the tribal population, several schools in each of the three tribal areas were selected. There were two prime considerations in the selection of the schools. These were: (1) The geographical location of the school within the tribal unit, and (2) The schools selected were rural schools so as to control as far as possible foreign cultural influences.

The schools were not randomly selected but were selected on the basis of their geographical locations within a tribal unit. In the Central African Federation the three schools selected for the testing

were: The Zimba School, the Siachitema School and the Choma School. These schools, each bearing the name of the local sub-chief, were located in three important political sub-set divisions of the total tribal area and appeared to be representative of the whole population. In Swaziland, four schools were selected on the same basis as those in the Central African Federation. The schools were: The Bremesdorp School, the Stegi School, the Ebenezer Mission School and the Endhlalane School. In the Province of Natal, in the Republic of South Africa, three schools were tested within the Zulu tribe. The Natal Inspector of Bautu Education had to approve the testing program in the Zulu schools, and he assigned the schools to be tested. They were: The Mseni School, the Dweshula School and the Emmanuel Mission School. These schools were located about 100 miles South of the city of Durban, along the South coast of Natal.

The distance between each school in the Central African Federation was approximately 60 miles. In Swaziland the schools ranged from three to 40 miles apart. The schools in the Zulu tribe were approximately 20 miles apart. The distance between the Swazi and Zulu tribes was approximately 350 miles while the Central African Federation tribe was about 700 miles to the North of either the Swazi or Zulu tribes. As far as could be determined, none of the children tested had ever come in contact with a member of the other two tribes. Consequently, any contamination from other tribal cultural influences was held to be nil.

The Student Sample: The sample consisted of those students in each class whose academic standing was no lower than the 70th percentile

for the high achievers, and no higher than the 30th percentile for the low achieving students. The chronological age level of all children tested was approximately 11 years. However, it was impossible to accurately determine their age because no records of date of birth are available, and the teacher's estimate of the subjects age had to be used.

The selection of the low achievers and high achievers was considerably more difficult than the selection of the schools, due to the fact that the teachers, who had had no more than ten years of schooling, found it difficult to identify those students who were mentally retarded or gifted. The subjects were finally selected on the basis of the following criteria:

1. The teacher's evaluation of the subject's academic achievement during the current school term.
2. The subject's grades for all school subjects taken during the previous two school terms were averaged and only those students whose averaged grades were either above the 70th percentile of class being tested, or below the 30th percentile of the same class were chosen as the samples for this study.

The subjects were drawn from the Standard III grade. They came from rural African families whose socio-economic stata were about equal. The sample consisted of 98 children with 29 drawn from Swaziland, 51 drawn from the Republic of South Africa, and 18 from the Central African Federation.

Administration of the Tests: The test was administered according to instructions sent to the examiner. The testing instructions were as follows:

1. The subjects were to be seated a suitable distance apart to avoid the temptation to copy ideas from another.
2. The subjects were to be supplied with manila folders on which the tests were to be drawn. This was to insure uniform drawing surface.
3. Number two drawing pencils were given to each subject, again to insure uniformity and because of their advantage of not smudging or blurring in the handling of the drawings.
4. The subjects were given the following instructions in accordance with Kinget's instructions (15:28-29).

> On this form you see eight squares. Each of these squares contains little signs. These signs have no special meaning; they are to be part of your drawings which I want you to make in each of the squares. You may draw whatever you like and you may start with the sign you like best. You may work as long as you wish and you may use the eraser. Do not, however, turn the sheet. This must be the top (Examiner illustrates). When you have finished your drawings hold up your hand and I will come and get it.

Since this was a new type of task for the children, a little additional assurance was given them. They were told that this was not a test to see how well they could draw but only to see what they liked to draw. They were given permission to ask questions during the test; however, the examiners were instructed to always answer with the stock phrase "You may draw whatever you wish to draw." The subjects were given a few minutes to become familiar with the test blank and ask questions concerning it. All seemed to understand the task and no questions were asked. The subjects were, without exception, cooperative and highly interested in the test, and as a token of appreciation for their time and efforts, the subjects were given the pencils they used for their drawings.

The Scoring System: In computing the scores for each of the three hypotheses, the same type of scoring blank was used (see Tables I to XVIII). These scoring forms were so constructed that they could accommodate the total sample score of each of the sample groups--low and high achievers--for each particular culture group. The scoring form also provided for the scoring of each of the eight frames of the test. The average score of these eight frames was recorded in the score column. Finally, the sum of the figures in the score column was recorded in the totals column.

The scoring for the first hypothesis (that of integration of stimuli) was as follows. In any particular frame a score of "one" (denoted by "1") was given for any drawing which incorporated the stimuli in a manner which suggested that the subjects were cognizant of the stimuli. In any particular frame a half point (denoted by "X")

was given to any drawing in which there was evidence that the stimuli was recognized but not incorporated into the drawing. When there was no incorporation of the stimuli, neither evidence of awareness by the subject of that stimuli, a score of "0" was given for such frames. Similarly, in the case of the second hypothesis, that of a marked repetition of simple graphic themes, a negative score of "one" (denoted by "1") point was given to a frame which had a repetitious theme. In cases of doubt, a negative half point (denoted by "X") was given. In drawings where there was no evidence of repetitious themes a score of "0" was given. In the case of the third hypothesis, that of bursting the frame, if the subject burst the spatial division of the frame, he was given a negative score of "one" for each frame drawn in this manner. If all the drawings were contained within the boundary limits then a score of "0" was awarded.

Statistical Procedures: The testing of each of the three hypotheses hinges on the comparison of the mean scores for the high and low achieving criterion groups. This comparison will be made for each cultural sample individually. Generally, it may be stated that the hypotheses will be tested on the basis of the null hypothesis---that there is no significant difference between the population mean scores of the high and low achieving samples of any of the particular culture groups. More specifically, it is that the mean for high achievers will not exceed the mean for low achieving students in integration of stimuli and that the means for low achieving students will not exceed the means for high achievers in repetition of simple themes and in bursting the frame. The hypotheses will be tested

on the assumption that the variances of both groups are unequal and that the true variances σ^2 are not known, where

$\bar{X}_1$ = mean of first sample

$\bar{X}_2$ = mean of second sample

N_1 = number in first sample

N_2 = number in second sample

S_1^2 = variance of first sample

S_2^2 = variance of second sample.

The statistic to test whether two populations have the same mean when the variances are not equal (and utilizing the observed S_1, and S_2 for σ_1 and σ_2) is

$$\frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{(S_1^2/N) + (S_2^2/N_2)}}$$

with (N-2) degrees of freedom where

$$f = \frac{\left(\frac{S_1^2}{N_1} + \frac{S_1^2}{N_2}\right)^2}{\frac{\left(\frac{S_1^2}{N_1}\right)^2}{N_1+1} + \frac{\left(\frac{S_2}{N_2}\right)^2}{N_2+1}} - 2$$

the expression $(\sigma_1 - \sigma_2) = 0$ when we assume that the true means are equal (8:112-124). Where the probability that the difference between means would occur by chance was less than five times in a hundred (.05) the null hypothesis was rejected.

CHAPTER IV

ANALYSIS OF THE DATA

The basic data of the results of this study are contained in Tables I through XVIII. They list for every subject the score obtained for each of the eight frames of The Drawing Completion Test, the (N) number of the sample, the ($\bar{X}$) mean of the sum of the scores of the particular sample and the (S) standard deviation from the mean of the sample. Table XIX records the results of the test of significance of the means of the high and low achieving students of each culture group sampled.

From Tables I through VI, which record the results of the Swazi sample, it will be noted that the data were based on a sample of 12 subjects for the high achievers and a sample of 17 students for the low achieving students. From Tables VII through XII, which record the results of the Zulu sample, it will be noted that the data were based on a sample of 20 subjects for the high achievers and a sample of 31 students for the low achieving students. From Tables XIII through XVIII, which record the results from the Central African Federation sample, it will be noted that the data were based on a sample of 8 subjects for the high achievers and 10 subjects for the low achieving students.

TABLE I

SUMMARY OF RESULTS ON THE INTEGRATION OF STIMULI
HIGH ACHIEVING SAMPLE: SWAZI GROUP

FRAMES		1	2	3	4	5	6	7	8	Score
	1	1	1	1	1	1	1	1	1	8.0
	2	1	1	1	1	1	1	1	1	8.0
S	3	1	0	1	1	1	1	1	1	7.0
U	4	x	0	x	1	0	x	x	x	3.5
B	5	1	0	1	1	1	1	1	1	7.0
J	6	1	1	1	1	1	1	1	1	8.0
E	7	0	0	0	0	0	0	0	0	0.0
C	8	0	0	x	0	0	x	0	x	1.5
T	9	0	0	0	0	0	0	0	0	0.0
S	10	x	x	1	x	x	1	0	x	4.5
	11	x	0	x	x	x	1	1	x	4.5
	12	0	0	0	0	0	0	0	0	0.0
		6.5	3.5	7.5	7.0	6.0	8.0	6.5	7.0	52.0

N = 12
$\bar{X}$ = 4.3
S = 3.28

TABLE II

SUMMARY OF RESULTS ON THE INTEGRATION OF STIMULI
LOW ACHIEVING SAMPLE: SWAZI GROUP

FRAMES		1	2	3	4	5	6	7	8	Score
	1	0	0	0	x	0	0	0	x	1.0
	2	0	0	0	x	0	0	x	x	1.5
	3	1	1	1	1	x	1	x	0	6.0
	4	0	0	0	0	x	x	x	x	2.0
	5	1	0	0	0	0	0	0	0	1.0
S	6	0	0	0	0	0	0	0	0	0.0
U	7	0	0	0	x	0	x	x	x	2.0
B	8	0	x	0	1	0	x	x	x	3.0
J	9	0	0	0	x	0	0	0	0	.5
E	10	0	0	1	x	0	x	x	0	2.5
C	11	0	0	0	0	0	0	x	x	1.0
T	12	1	0	0	0	0	0	0	x	1.5
S	13	0	0	0	0	0	0	0	0	0.0
	14	0	0	0	0	0	0	0	0	0.0
	15	0	0	0	0	0	0	0	0	0.0
	16	0	0	0	0	0	0	0	0	0.0
	17	x	1	1	1	x	1	x	x	6.0
		3.5	2.5	3.0	5.5	1.5	4.0	4.0	4.0	28.0

N = 17
$\bar{X}$ = 1.6
S = 1.85

TABLE III

SUMMARY OF RESULTS ON THE REPETITION OF THEMES
HIGH ACHIEVING SAMPLE: SWAZI GROUP

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	0	0	0	0.0
2	0	0	0	0	0	0	0	0	0.0
3	0	0	0	0	0	0	0	0	0.0
4	0	0	1	0	1	1	1	0	4.0
5	0	0	0	0	0	0	0	0	0.0
6	0	1	0	0	0	0	0	0	1.0
7	0	0	0	0	0	0	0	0	0.0
8	0	0	0	0	0	0	0	1	1.0
9	0	0	0	0	0	0	0	1	1.0
10	0	0	0	1	0	0	0	0	1.0
11	0	1	0	1	1	0	0	0	3.0
12	0	0	0	0	0	0	0	0	0.0
	0	2.0	1.0	2.0	2.0	1.0	1.0	2.0	11.0

N = 12
$\bar{X}$ = .91
S = 1.30

TABLE IV

SUMMARY OF RESULTS ON THE REPETITION OF THEMES
LOW ACHIEVING SAMPLE: SWAZI GROUP

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	1	0	1	2.0
2	0	0	0	0	0	0	0	0	0.0
3	0	0	0	0	0	0	0	0	0.0
4	0	0	1	0	1	1	0	1	4.0
5	0	0	0	0	0	1	0	1	2.0
6	0	0	0	0	0	0	1	0	1.0
7	0	0	0	0	0	0	0	0	0.0
8	0	0	0	0	1	1	x	x	3.0
9	0	0	0	0	0	0	0	1	1.0
10	0	0	0	0	0	1	0	1	2.0
11	0	0	0	1	1	1	0	1	4.0
12	0	0	0	0	0	0	0	0	0.0
13	0	x	0	0	0	1	1	x	3.0
14	0	0	x	x	0	0	0	1	2.0
15	0	0	0	0	0	1	0	0	1.0
16	0	0	0	0	0	0	0	0	0.0
17	0	0	0	0	0	0	x	x	1.0
	0	.5	1.5	1.5	3.0	8.0	3.0	8.5	26.0

N = 17
$\bar{X}$ = 1.5
S = 1.17

TABLE V

SUMMARY OF RESULTS ON THE BURSTING OF FRAME
HIGH ACHIEVING SAMPLE: SWAZI GROUP

FRAMES		1	2	3	4	5	6	7	8	Score
SUBJECTS	1	0	0	0	0	0	0	0	0	0.0
	2	0	0	0	0	0	0	0	0	0.0
	3	0	0	0	0	0	0	0	0	0.0
	4	0	0	0	0	0	0	0	0	0.0
	5	0	1	1	0	1	1	0	0	4.0
	6	0	0	1	1	0	0	0	0	2.0
	7	0	0	1	0	0	0	1	0	2.0
	8	0	0	0	0	0	0	0	0	0.0
	9	0	0	0	0	0	0	0	0	0.0
	10	0	1	0	1	0	0	0	0	2.0
	11	0	0	0	0	0	0	0	0	0.0
	12	0	0	0	0	0	0	0	1	1.0
		0	2.0	3.0	2.0	1.0	1.0	1.0	1.0	11.0

N = 12
$\bar{X}$ = .91
S = 1.30

TABLE VI

SUMMARY OF RESULTS ON THE BURSTING OF FRAME
LOW ACHIEVING SAMPLE: SWAZI GROUP

FRAMES		1	2	3	4	5	6	7	8	Score
SUBJECTS	1	0	0	0	0	0	0	0	0	0.0
	2	1	0	0	0	0	0	0	0	1.0
	3	0	0	0	0	0	0	0	0	0.0
	4	1	0	1	0	0	0	0	1	3.0
	5	0	0	0	0	0	0	1	1	2.0
	6	0	0	0	0	0	0	0	0	0.0
	7	0	0	0	0	1	0	0	0	1.0
	8	0	0	1	0	0	0	0	0	1.0
	9	0	0	1	1	0	0	0	1	3.0
	10	0	0	0	0	0	0	0	1	1.0
	11	0	0	0	0	0	0	0	0	0.0
	12	0	0	0	1	0	0	0	0	1.0
	13	0	0	1	0	0	0	0	0	1.0
	14	0	0	0	0	1	0	0	0	1.0
	15	0	0	0	1	0	0	0	0	1.0
	16	0	0	0	0	0	0	0	0	0.0
	17	0	0	0	0	0	0	0	0	0.0
		2.0	0	4.0	3.0	2.0	0	1.0	4.0	16.0

N = 17
$\bar{X}$ = .88
S = .30

TABLE VII

SUMMARY OF RESULTS ON THE INTEGRATION OF STIMULI
HIGH ACHIEVING SAMPLE: ZULU GROUP

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	1	1	1	1	1	1	1	1	8.0
2	1	1	1	1	1	1	1	1	8.0
3	1	1	1	1	1	1	1	1	8.0
4	1	1	1	1	1	1	1	1	8.0
5	1	x	0	x	x	x	x	x	4.0
6	1	1	1	1	1	1	1	1	8.0
7	0	0	0	0	x	0	1	0	1.5
8	x	0	0	1	x	x	0	x	3.0
9	0	0	0	0	0	0	0	0	0.0
10	x	0	x	0	0	0	0	0	1.0
11	x	1	0	1	0	0	0	0	2.5
12	x	0	0	x	x	x	x	x	3.0
13	1	0	x	x	0	x	0	0	2.5
14	x	x	0	x	x	x	x	x	3.5
15	x	x	1	x	x	1	x	1	5.5
16	1	x	0	1	0	0	0	x	3.0
17	0	0	0	0	0	x	0	0	.5
18	x	x	x	x	0	x	x	1	4.0
19	0	0	0	x	0	x	0	0	1.0
20	0	0	0	0	0	x	0	0	.5
	11.5	8.5	7.5	11.5	8.0	10.5	8.5	9.5	75.5

$N = 20$

$\bar{X} = 3.77$

$S = 2.84$

TABLE VIII

SUMMARY OF RESULTS ON THE INTEGRATION OF STIMULI
LOW ACHIEVING SAMPLE: ZULU GROUP

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	0	0	0	0.0
2	1	0	0	0	0	x	0	x	2.0
3	0	0	0	0	0	0	0	0	0.0
4	0	0	0	0	0	0	0	0	0.0
5	x	0	0	x	0	0	0	0	1.0
6	x	x	0	0	0	0	0	0	1.0
7	x	0	0	x	0	0	0	0	1.0
8	1	1	0	1	0	0	0	0	3.0
9	x	x	1	1	x	x	0	1	5.0
10	1	x	x	x	0	1	1	1	5.5
11	1	x	0	x	1	1	1	x	5.5
12	1	1	1	x	1	1	1	x	7.0
13	1	x	1	0	1	1	1	1	6.5
14	0	0	0	0	0	0	0	0	0.0
15	0	0	0	0	0	0	0	0	0.0
16	0	x	x	0	0	0	0	0	1.0
17	0	0	0	0	0	0	0	0	0.0
18	0	0	0	0	0	0	0	0	0.0
19	x	0	0	x	0	0	0	0	1.0
20	0	0	0	0	0	0	0	1	1.0
21	0	0	0	0	0	0	0	0	0.0
22	0	0	0	0	0	0	0	0	0.0
23	0	0	0	0	0	0	0	0	0.0
24	0	0	0	0	x	1	0	0	1.5
25	x	x	0	0	0	x	x	0	2.0
26	1	x	1	x	0	1	0	0	4.0
27	x	0	0	0	0	x	0	1	2.0
28	x	0	0	x	x	x	0	0	2.0
29	0	0	0	x	0	0	0	x	1.0
30	x	0	0	0	0	0	0	0	.5
31	x	0	0	0	0	0	0	0	.5
	12.0	6.0	5.0	6.5	4.5	8.5	4.5	7.0	54.0

$N = 31$

$\bar{X} = 1.74$

$S = 2.10$

TABLE IX

SUMMARY OF RESULTS ON THE INTEGRATION OF STIMULI
HIGH ACHIEVING SAMPLE: ZULU GROUP

FRAMES	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	0	0	0	0.0
2	0	0	0	0	0	0	0	0	0.0
3	0	0	0	0	0	0	0	0	0.0
4	0	0	0	0	0	0	0	0	0.0
5	0	0	0	x	0	x	x	0	1.5
6	0	0	0	0	0	0	0	0	0.0
7	0	0	0	0	0	1	0	1	2.0
8	0	0	0	0	0	0	1	0	1.0
9	0	0	0	0	0	0	0	0	0.0
10	0	0	0	0	1	0	0	0	1.0
11	0	0	0	0	x	1	0	0	1.5
12	0	0	0	0	0	0	0	0	0.0
13	0	0	0	0	0	0	0	0	0.0
14	0	0	0	0	0	0	1	0	1.0
15	0	0	0	0	0	0	0	0	0.0
16	0	0	0	1	0	0	1	0	2.0
17	0	0	0	0	0	0	1	1	2.0
18	0	0	0	0	0	0	0	1	1.0
19	0	1	0	0	1	0	1	1	4.0
20	0	0	0	1	0	0	1	0	2.0
	0	1.0	0	2.5	2.5	2.5	6.5	4.0	19.0

SUBJECTS

N = 20
$\bar{X}$ = .92
S = 1.08

TABLE X

SUMMARY OF RESULTS ON THE REPETITION OF THEMES
LOW ACHIEVING SAMPLE: ZULU GROUP

FRAMES	1	2	3	4	5	6	7	8	Score
1	0	0	1	0	0	0	0	0	1.0
2	0	0	1	0	1	0	0	0	2.0
3	0	0	0	1	0	0	1	0	2.0
4	0	0	1	1	0	1	0	0	3.0
5	0	0	1	1	1	1	0	1	5.0
6	0	1	0	0	0	0	0	1	2.0
7	0	0	0	1	0	0	0	0	1.0
8	0	0	0	0	0	0	0	0	0.0
9	0	0	0	0	0	0	0	0	0.0
10	0	0	0	0	1	0	1	0	2.0
11	0	0	0	0	0	1	0	0	1.0
12	0	0	0	0	0	0	0	0	0.0
13	0	0	0	x	0	0	1	0	1.5
14	0	1	1	0	1	1	0	1	5.0
15	1	0	0	1	0	1	1	1	5.0
16	0	0	0	1	0	x	1	1	3.5
17	0	0	0	0	0	0	0	1	1.0
18	0	0	0	0	0	0	1	1	2.0
19	0	0	0	0	1	1	0	0	2.0
20	0	1	1	0	1	1	0	0	4.0
21	0	0	1	1	0	1	0	0	3.0
22	0	0	0	0	1	0	1	1	3.0
23	0	0	0	1	1	0	x	x	3.0
24	0	0	0	0	0	0	0	0	0.0
25	0	0	0	0	0	0	1	1	2.0
26	0	x	0	1	0	1	1	0	3.5
27	0	0	0	1	1	0	1	1	4.0
28	0	0	0	0	0	0	1	1	2.0
29	0	0	0	0	0	0	1	0	1.0
30	0	0	0	x	0	0	x	0	1.0
31	0	0	0	0	0	x	1	0	1.5
	1.0	3.5	7.0	11.0	9.0	10.0	14.0	11.5	67.0

SUBJECTS

$N = 31$

$\bar{X} = 2.16$

$S = 1.48$

TABLE XI

SUMMARY OF RESULTS ON THE BURSTING OF FRAME
HIGH ACHIEVING SAMPLE: ZULU GROUP

FRAMES		1	2	3	4	5	6	7	8	Score
SUBJECTS	1	0	0	0	0	0	0	0	0	0.0
	2	0	0	0	0	0	0	0	0	0.0
	3	0	0	1	0	0	0	0	0	1.0
	4	0	0	0	1	0	0	0	0	1.0
	5	0	0	0	0	0	0	0	0	0.0
	6	0	0	0	0	0	0	0	0	0.0
	7	0	0	1	1	1	1	1	1	6.0
	8	0	0	1	0	0	0	0	0	1.0
	9	1	0	1	0	0	0	0	0	2.0
	10	0	0	0	0	0	0	0	0	0.0
	11	0	0	0	0	0	0	0	0	0.0
	12	0	0	0	0	0	0	0	0	0.0
	13	0	0	0	0	0	0	0	0	0.0
	14	0	0	1	0	0	0	0	0	1.0
	15	0	0	0	0	0	0	0	0	0.0
	16	0	0	0	0	0	0	0	0	0.0
	17	0	0	0	0	0	0	0	0	0.0
	18	0	0	0	0	0	0	0	0	0.0
	19	0	0	0	0	0	0	0	0	0.0
	20	1	1	0	1	1	0	1	1	6.0
		2.0	1.0	5.0	3.0	2.0	1.0	2.0	2.0	18.0

$N = 20$

$\bar{X} = .9$

$S = 1.83$

TABLE XII

SUMMARY OF RESULTS ON THE BURSTING OF FRAME
LOW ACHIEVING SAMPLE: ZULU GROUP

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	0	0	0	0.0
2	0	0	0	0	0	0	0	0	0.0
3	0	0	0	0	0	0	0	0	0.0
4	0	0	0	0	0	0	0	0	0.0
5	1	0	0	0	0	0	0	0	1.0
6	0	1	1	0	0	0	0	0	2.0
7	0	0	0	0	0	0	0	0	0.0
8	1	0	0	1	0	0	1	0	3.0
9	0	0	0	0	0	0	0	0	0.0
10	0	0	0	0	1	0	0	0	1.0
11	0	0	0	0	0	0	0	0	0.0
12	0	0	0	0	0	0	0	0	0.0
13	0	0	1	0	1	0	0	0	2.0
14	0	0	0	1	0	0	1	0	2.0
15	0	0	0	0	1	0	0	0	1.0
16	0	0	0	0	0	0	0	0	0.0
17	0	0	0	0	0	0	0	0	0.0
18	0	0	0	0	0	0	0	0	0.0
19	0	0	0	0	0	0	0	1	1.0
20	0	0	0	0	0	0	0	0	0.0
21	0	1	1	0	0	0	0	0	2.0
22	0	0	0	0	0	0	0	0	0.0
23	0	0	0	0	0	0	0	0	0.0
24	0	0	0	0	0	0	0	0	0.0
25	0	0	0	0	0	0	0	0	0.0
26	0	0	0	0	0	0	0	0	0.0
27	0	0	1	1	0	0	0	0	2.0
28	0	0	0	0	0	0	0	0	0.0
29	0	0	0	0	0	0	0	1	1.0
30	0	0	0	0	0	0	0	0	0.0
31	0	0	0	0	0	0	0	0	0.0
	2.0	2.0	4.0	3.0	3.0	0	2.0	2.0	18.0

$N = 31$

$\bar{X} = .6$

$S = .27$

TABLE XIII

SUMMARY OF RESULTS ON THE INTEGRATION OF STIMULI
HIGH ACHIEVING SAMPLE: CENTRAL AFRICAN FEDERATION

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	1	1	x	1	1	1	1	1	7.5
2	1	1	1	1	1	1	x	1	7.5
3	1	1	x	x	1	1	x	1	6.5
4	x	1	1	1	1	1	1	1	7.5
5	1	x	x	1	1	1	1	1	7.0
6	1	1	1	1	x	1	1	1	7.5
7	1	x	x	1	1	1	1	1	7.0
8	1	1	1	1	1	1	1	1	8.0
	7.5	7.0	6.0	7.5	7.5	8.0	7.0	8.0	58.5

N = 8
$\bar{X}$ = 7.31
S = .47

TABLE XIV

SUMMARY OF RESULTS ON THE INTEGRATION OF STIMULI
LOW ACHIEVING SAMPLE: CENTRAL AFRICAN FEDERATION

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	0	0	0	0.0
2	1	x	x		0	0	x	1	3.5
3	1	x	1	x	1	1	1	1	7.0
4	x		0	0	0	0	0	0	.5
5	1	0	1	0	x	1	1	1	5.5
6	0	0	0	0	0	0	0	0	0.0
7	0	0	1	0	0	0	0	x	1.5
8	x	0	1	0	x	0	x	1	3.5
9	1	x	x	0	0	0	0	1	3.0
10	0	0	0	0	0	0	0	1	1.0
	5.0	1.5	5.0	.5	2.0	2.0	3.0	6.5	25.5

N = 10
$\bar{X}$ = 2.55
S = 2.38

TABLE XV

SUMMARY OF RESULTS ON THE REPETITION OF THEMES
HIGH ACHIEVING SAMPLE: CENTRAL AFRICAN FEDERATION

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	0	x	0	.5
2	0	0	0	0	x	x	0	0	1.0
3	0	0	x	0	0	0	0	0	.5
4	0	0	0	0	0	0	0	0	0.0
5	0	0	0	0	0	0	0	0	0.0
6	0	0	0	0	1	1	0	0	2.0
7	0	0	0	0	0	0	1	0	1.0
8	0	0	0	0	0	0	0	1	1.0
	0	0	.5	0	1.5	1.5	1.5	1.0	6.0

N = 8
$\bar{X}$ = .75
S = .65

TABLE XVI

SUMMARY OF RESULTS ON THE REPETITION OF THEMES
LOW ACHIEVING SAMPLE: CENTRAL AFRICAN FEDERATION

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	0	0	0	0	1	x	0	1.5
2	0	x	0	0	1	1	0	0	2.5
3	0	0	0	x	0	0	0	0	.5
4	0	0	0	0	0	0	0	0	0.0
5	0	0	0	0	0	0	0	0	0.0
6	0	0	0	0	0	0	0	0	0.0
7	0	0	0	0	x	0	x	x	1.5
8	0	0	1	0	1	x	x	0	3.0
9	0	0	0	0	1	1	1	0	3.0
10	0	0	0	1	0	1	0	x	2.5
	0	.5	1.0	1.5	3.5	4.5	2.5	1.0	14.5

N = 10
$\bar{X}$ = 1.45
S = 1.25

TABLE XVII

SUMMARY OF RESULTS ON THE BURSTING OF FRAME
HIGH ACHIEVING SAMPLE: CENTRAL AFRICAN FEDERATION

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	1	0	0	0	0	0	0	1	2.0
2	0	0	0	0	0	0	0	0	0.0
3	0	0	0	0	0	0	0	0	0.0
4	0	0	0	0	1	0	0	0	1.0
5	1	0	0	0	0	0	0	0	1.0
6	0	0	0	0	0	0	0	0	0.0
7	0	0	0	0	0	0	0	0	0.0
8	0	0	0	0	0	0	0	0	0.0
	2.0	0	0	0	1.0	0	0	1.0	4.0

N = 8
$\bar{X}$ = .5
S = .75

TABLE XVIII

SUMMARY OF RESULTS ON THE BURSTING OF FRAME
LOW ACHIEVING SAMPLE: CENTRAL AFRICAN FEDERATION

FRAMES / SUBJECTS	1	2	3	4	5	6	7	8	Score
1	0	1	0	1	1	1	0	0	4.0
2	0	1	0	1	0	0	0	1	3.0
3	1	1	0	1	0	0	0	0	3.0
4	0	1	0	0	0	0	0	0	1.0
5	0	0	1	1	0	0	0	0	2.0
6	0	0	1	0	0	0	0	0	1.0
7	0	0	1	1	1	0	0	0	3.0
8	0	0	0	0	0	0	0	0	0.0
9	0	0	0	0	0	0	0	0	0.0
10	0	0	0	0	0	0	0	0	0.0
	2.0	4.0	4.0	4.0	3.0	1.0	1.0	2.0	17.0

N = 10
$\bar{X}$ = 1.70
S = 1.49

Results

Summary statistics for high achieving and low achieving groups from Swazi, the Republic of South Africa, and the Central African Federation samples, on each of three major variables are presented in Table XIX.

TABLE XIX

SUMMARY OF RESULTS OF THE TEST OF HYPOTHESES

	Diff. of Means	S.E.of Diff.	t	d.f.	P
Hypothesis 1					
Swazi	2.70	1.062	2.54	18	<.025
Zulu	2.03	.74	2.74	33	<.005
Central African Federation	4.70	.77	6.10	5	<.005
Hypothesis 2					
Swazi	.59	.472	1.25	17	<.25
Zulu	1.24	.360	3.44	54	<.005
Central African Federation	.70	.46	1.52	15	<.25
Hypothesis 3					
Swazi	-.03	(No need to test hypothesis since it is stated as one-tailed)			
Zulu	-.3				
Central African Federation	1.2	.54	2.21	15	<.025

For all three samples on Hypothesis 1 there was no acceptance of the null hypothesis between the means of the high achieving and low

achieving groups. Since the high achieving groups had the higher mean scores it was demonstrated that integration of stimuli contributes to a differentiation between the groups.

Only the Zulu sample provided a significant probability level between the means of the high achieving and low achieving groups on Hypothesis 2, that of repetition of drawing themes.

Only the Central African Federation sample indicated a significant difference between the means on Hypothesis 3; bursting the frame.

In view of the findings it appears safe to assume that only the first hypothesis, that of integration of stimuli, does discriminate between high achieving and low achieving children in the three culture groups studied.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this investigation was to ascertain the value of The Drawing Completion Test for indicating academic achievement by the drawing formations of low achievers and high achievers in the Central African Federation, the Republic of South Africa, and the British Protectorate of Swaziland.

Three hypotheses were advanced relative to the purpose of this study. It was hypothesized that low achieving students in the Central African Federation, in the Republic of South Africa and in the British Protectorate of Swaziland, in contrast to the high achievers in the same area would:

1. Fail to integrate the stimuli given in the test blank in their finished drawings.
2. Show a marked repetition of simple graphic themes in their drawings, and
3. They would tend to "burst the frame" or disregard the spacial divisions of the test.

Methodology and Sample

The Drawing Completion Tests were administered in group settings in the various schools which were selected for the investigation. The schools were selected on the basis of their geographical location within the three tribal units selected for the study.

The sample consisted of those students in each class whose academic standing was no lower than the 70th percentile for the high achievers, and no higher than the 30th percentile for the low achieving students. As far as was possible, their chronological age was held constant at about 11 years. It was impossible to accurately determine their age because no records of date of birth were available, and the teacher's estimate of the subject's age had to be used.

Findings

1. The difference between the mean scores of the low achievers and high achievers for the first hypothesis, that of integration of stimuli, was shown to be significant at the .05 level of confidence. The direction of the difference was in the favor of the high achievers. The difference obtained in the samples from the Central African Federation and the samples from the Republic of South Africa was found to be significant at the .01 level of confidence, while the difference obtained in the samples of the Swazi group was insignificant at the .05 level of confidence.
2. The difference between the mean scores of the low achievers and high achievers for the second hypothesis, that of repetition of simple graphic themes, was shown to be non-significant for the Central African Federation and Swazi samples. The difference obtained in the samples from the Republic of South Africa was significant at the

.05 level of confidence. The difference was in the favor of the gifted students.

3. The difference between the mean scores of the low achievers and high achievers for the third hypothesis, that of bursting the frame, was shown not to be significant for the samples from the Republic of South Africa and Swazi culture groups. The difference obtained in the samples from the Central African Federation was shown to be significant at the .05 level. The direction of the difference was in the favor of the high achievers.

Conclusions

The data appear to justify the following conclusions, subject to the limitations of the study:

1. Since there is a significant difference in the integration of the stimuli in the drawings of low achieving students and high achievers in the three culture groups tested, it might be concluded that The Drawing Completion Test is an instrument which could significantly discriminate between low achievers and high achievers in other African culture groups.
2. Since The Drawing Completion Test appears to be an instrument which significantly discriminates between low and high achieving African students, it might be concluded that the wide use of this test could significantly reduce the drop-out trend in African schools through a method of

student selection, and thereby greatly relieve the financial burden of supporting mass primary education programs in the newly emerging countries of Africa.

Recommendations

The following general recommendations are offered for further research:

1. A replication study should be conducted on larger samples drawn from culture groups in Africa as a check on the results and conclusions offered in this study.
2. Additional research is needed to further refine The Drawing Completion Test as an intelligence instrument.

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