MEASURING EDUCATIONAL POTENTIAL WITH THE DRAW - A - PERSON TEST

BY

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Most sincere thanks go to my supervisor, Dr. Bali, for her untiring efforts in guiding me and seeing to it that I completed my work.

A lot of thanks too go to Dr. Chirwa and Mr. Kamara for their insightful suggestions. I am also most grateful to Dr. Kariuki and Mr. Masime for their assistance.

Special thanks are owed to the 272 pupils who participated in this study and to their teachers.

This thesis has been submitted for examination with my approval as a University Supervisor.

Best but not least thanks go to Kenyatta University for offering me a scholarship which enabled me to carry out this research.

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This study was aimed at validating the use of the Draw - A - Person (DAP) test in Kenya to measure the Intellectual Maturity of children between the ages of six and nine years. The measure would then be used to accurately group pupils, in the lower primary classes of Kenya, in terms of their mental capabilities in order to be able to offer them more effective classroom instruction.

The subjects for the study were 360 primary school pupils from standard I, II and III of four primary schools in Nairobi Province whose average age was 7.5 years. Two of the schools were high cost schools and the other two were low cost schools.

All the subjects were administered the DAP test. The test consists of a drawing of a Man, a drawing of a Woman and a drawing of the Self in that order in a test booklet. The children's drawings were then hand-scored and an average score obtained for each pupil. The data was coded and the services of a computer utilized to perform descriptive and inferential analysis. The Statistical package for Social Sciences (SPSS Nie, et.al., 1975) was used to set a program for the computer. In addition, information on each subject's past academic performance in class was obtained from the class teachers.
The one-way ANOVA analysis indicated significant differences in scores between the age groups (six, seven, eight and nine years).

Significant differences were also found for the drawings of a Woman and the Self when the performance of male and female subjects were compared using a t-test. The differences were not significant for the drawing of a Man.

Further, the one-way ANOVA results indicated significant differences in performance between subjects from the high cost and those from the low cost schools.

Finally, the analysis revealed that the DAP test scores were well correlated. The correlation between Man drawing and Woman drawing was +0.62; between Man and Self +0.63 and between Woman and Self +0.71. These scores also correlated well with school performance.

It was concluded that: firstly, the performance on the DAP test was maturational in nature and thus improved with increasing age; secondly, that since the upbringing of boys and girls varies considerably, this determines how and what concepts they form and this determines their performance on the DAP test, however, even with separate assessments for boys and girls the results could still be meaningful in a coeducational classroom; thirdly, that school
conditions especially those of the low cost schools need to be improved upon in order to boost the ability of the pupils to the maximum; and lastly, that the DAP test scores could complement the teachers’ classroom assessments very effectively and objectively.
CHAPTER I

INTRODUCTION

This is a study of validating a test that can be used in a classroom to identify mental abilities in young children at the earliest time possible with an aim of improving on the education offered to children in Kenya.

It is widely accepted that education plays an important role in development and hence education is in the frontline of national planning in many countries of the world and nations are investing heavily in the education of their peoples. Kenya, for example, is striving to provide more educational facilities while at the same time improving on the quality of education offered in an effort to produce more productive citizens which is intended to establish a firmer basis for future development. It is in line with this that school enrollment in Kenya is rapidly increasing. By 1982 for example, the primary school enrollment was 92% of the primary school age population while at independence it was 60%.

In addition, there is rapid improvement in teacher training and an increased government expenditure on education as a whole. At present Kenya spends 30% of its recurrent budget on education (Development Plan 1984 – 1988).
Improvement in the quality of education provided is easily reflected in the newly introduced '8-4-4' (8 years primary, 4 years secondary and 4 years university) school system which is aimed at alleviating the problem of unemployment by providing an all round education that will make the young school graduate self-reliant.

However, for a justification of the great emphasis placed on education, classroom instruction must be as effective as possible as this is the best way of ensuring that every child that goes through the education system will have fully benefited from that education. If classroom instruction is to be as effective as possible, the child's educational potential must be realized and the teacher should have a way of accurately identifying that educational potential in each individual child. At the moment, the teacher uses pupil's classwork tests and/or marks to try and group the children. These teacher assessments based on achievement tests are often subjective which make the teacher directly conscious of the dilemma of her/his profession (Hellmut 1984).

It becomes evident then that the teacher requires more objective methods of accurately identifying what her/his pupils are capable and/or incapable of doing as far as classwork is concerned. Only then can the society be sure that the education provided is meaningful for all the pupils that join the school system.
Moreover, since primary education will be terminal for the majority of pupils as is projected in the country's five year development plan, it is important that each individual child benefits fully from the education provided. There is therefore, an urging need for more objective methods that could be used to accurately assess an individual child's mental capabilities in any given classroom setting. This would be a great step towards realising individual potential in our crowded classrooms.

The Rationale

Intelligence is a term that is widely used to refer to mental abilities. The trait intelligence may have a number of components: the cognitive component, the affective component and the psychomotor and motor skill component (Bloom 1956). Various scholars (Binet 1905, Terman 1938, Goodenough 1926, Thurstone 1938 and Harris 1963) attempted to define intelligence although it still remains difficult to find a generally accepted definition of intelligence. Goodenough's (1926) definition emphasised the fact that intelligence cannot be separated from man's actions and this is the ability to respond to situations with abstract ideas and generalized principles as opposed to isolated facts. Harris' (1963) definition was a follow up to Goodenough's although he replaced the idea of intelligence with intellectual maturity (used simultaneously with conceptional maturity).
Harris (1963) introduced the term intellectual maturity to enable him to look at children's concepts of the human figure as an index of their concepts generally. Intellectual maturity refers to the ability to form concepts of increasingly abstract character and in the formation of these concepts, the mental thought processes enable the child to identify, compare, abstract and generalize objects from the concepts. It is this process of concept formation that is the core of cognition or the knowing and the reasoning that we generally put together under mental or intellectual processes (Harris 1963). It is this mental process that enables the child to perceive an object and then transform it into a drawing.

The DAP test gives a score that is expected to indicate how the child perceives the human figure at the time of making the drawing and this would in turn be an indication of the child's general abstraction level. What the child draws will depend on her/his level of abstraction so that she/he will be drawing what she/he knows, thinks and reasons out. Hence the DAP test score would indicate the child's mental ability level.

Just as there were many attempts to define intelligence, so were there many attempts made to measure it (Binet 1905, Goodenough 1926, Thoundike 1926, Cattell 1960). In her attempt, Goodenough (1926) devised a scale of measuring intelligence which involved the drawing of a Man.
She chose the human figure as it was a subject that all children were equally familiar with and one which presented as little variability as possible in its essential characteristics. The human figure was also found to be simple in its general outline so that even very little children would be able to attempt it, yet sufficiently complicated in its detail to be able to tax the abilities of older children. Goodenough (1926) also found that the human figure was of universal interest and appeal and hence motivation would be maintained among the children.

Goodenough's (1926) original scale only included the drawing of a Man. Harris (1963) revised it to include the drawing of a Woman and the Self to give a more valid and reliable score. Harris' (1963) scale was adopted for this study and is here referred to as the Draw - A - Person (DAP) Test. It is composed of a Man, Woman and Self scales.

There is great emphasis placed on pre-school education at the moment to the extent that it is almost becoming compulsory for all children to attend one before joining primary school. This has led to a search for instruments that can be used to determine the mental ability in young children and the Ministry of Education Special Education Unit is trying to produce local instruments for the purpose. The DAP test could also be employed for the same purpose.
It must however be emphasised that the identification of mental ability levels and subsequent action need to be done at the earliest time possible. Early identification ensures that the necessary help is accorded the pupil and even specialized help like that of a psychologist may be sought before the problem is magnified. Most learning problems in children are problems that could have been corrected had they been identified early enough. For example, if we took the case of "a child with learning disability" problem may have started due to a negative self concept in the child (perhaps created by excessively harsh parents) formed in early childhood and this was carried over into the classroom. This then created a mental block in the child and made it extremely difficult for the child to learn. The teacher, being inadequately equipped with an instrument(s) to assess the child's mental abilities wrongly attributed the problem to low intelligence and did not give that child any extra attention. Perhaps that child had great academic potentiality but he ends up with a learning problem.

In validating the DAP test, this study considered the Age of the child, the Sex of the child, the Effect of School that a pupil attends and the Teacher's Rating of the pupil as important independent variables.
There are two broad categories that the primary schools in Nairobi may be divided into: the low-cost and the high-cost schools. There are striking differences between these schools that could have an effect on the DAP test scores obtained. Whereas the high-cost schools have a lot of facilities at their disposal, the low-cost schools do not have enough. The facilities here include desks, books, recreational apparatus and the teaching staff. The number of pupils per class in the low-cost schools is sometimes too large for the teachers to manage. So given these circumstances, the DAP test may not measure the mental ability of children from the different schools on the same level.

The Teacher's Rating of the pupil was considered in its relationship to the DAP test scores obtained. The Teacher's Rating is a five point scale which would give a child's global score which would in turn give a total picture of the pupil's performance in class.

The Draw - A - Person Test

The Draw - A - Person (DAP) test was to be used as a test that would measure the intellectual maturity of children between the ages of six and nine years with the objective of helping the teachers, psychologists, parents and educational planners to assess individual pupil's potential and provide appropriate attention accordingly.
The DAP test is centred around the drawing of a human figure. Children draw three pictures: Man (DAPM), Woman (DAPW) and Self (DAPS) in that order in a test booklet. Each of the three drawings are separated into various body parts (items) like the eyes, head, arms, mouth and neck for scoring purposes. Seventy three items for the Man drawing and seventy one items for the Woman drawing are isolated. The self drawing is scored using either the Man scale for the male pupils or the Woman scale for the female pupils. A total score of 217 points for boys \( (M = 73, W = 71, S = 73) \) and 215 points for girls \( (M = 73, W = 71, S = 71) \) is obtainable.

The DAP test is particularly useful as it allows for the testing of very young children who are limited in language and reading ability. The teacher in a standard one class for example, often finds herself/himself in a situation where she/he has children who can neither read nor write and who perhaps speak different vernaculars. It then becomes extremely difficult to find out what the mental level of these children may be. The DAP test allows for testing the mental level in such a situation. So such a non-verbal test is useful in a multi-lingual society such as ours. In addition the test is easy to administer and it is not subjective.
At the same time, although culture influences drawings in rather obvious ways such as the manner of dress, vehicles, implements and actions portrayed, these elements do not influence a DAP score (Harris 1963). The DAP test is therefore a culture free test because the children will draw persons as they perceive them. Polifka (1979 and MacMillan (1980) have also indicated that the DAP test is valid (in the U.S.) and reliable. These studies are reviewed in Chapter II. The DAP test is inexpensive as all the materials that would be required are paper for the test booklet and a good pencil. The test does not take long to administer, is easy and simple to use.

In addition it is realized that there is limited opportunity in education in Kenya and this calls for more demands on the selection of the pupils that join school and hence from an administrative point of view, the DAP test could be employed. Moreover, we have achieved or are just about to achieve universal primary education and so there is need to adjust the educational programme accordingly and the DAP test could help towards this end; for example a teacher may want to group children in her class and the DAP test could be appropriately utilized in the formation of the groups. The teacher could also use the DAP test to identify perceptual problems in the class.
Statement Of The Problem

This is a study intended to validate the use of the DAP test in Kenya as a measure of intellectual maturity of children between the ages of six and nine years. Intellectual maturity would be evident where the DAP scores would improve with increasing Age and where the Teacher's Rating of the pupil would correlate with the score obtained on the DAP test. This measure would help teachers in particular to plan better for their pupils. A study of this nature is therefore important and relevant. The main question to be answered therefore is: "Can the DAP test measure the mental maturity of children who are between six and nine years in Kenya?"

The next chapter shall present the Review of Literature which shall be followed by a chapter on the Methodology of the study. Chapter four shall then present the Results and their Interpretation and the final chapter shall discuss the Findings and give Recommendations.
CHAPTER II

THEORETICAL RATIONALE AND REVIEW OF RELATED LITERATURE

This chapter is divided into four sections. The first section shall look at the theoretical framework of the study; the second the empirical framework; the third the relationship between the DAP test and other tests of intelligence and the last section shall discuss the validity and reliability of the DAP test.

THE THEORETICAL FRAMEWORK OF THE STUDY

This section shall give an overview of how children's drawings are produced, the intellectual factor involved in the production of the drawings and how the DAP test evolved and what it purports to measure.

Children's Drawings: Their Production And The Intellectual Factor In Them

Primitive man used picture writing as a means of expressing her/his thoughts and children draw for much the same reason.
It is a way of making their ideas visible. As Harris (1963) stated:

"Increasingly the child's drawing becomes a form of language - a way of expressing concepts and ideas. It is thus a form of calligraphy, a kind of stylized writing".

So the child's drawing may be described as a non-verbal language.

In their development, most children leave behind a trail of drawings which they scribble with much enjoyment and with some degree of concentration. These drawings are the most reliable and enduring of spontaneous childish artifacts. In addition, children regard their drawings as important pieces of work and they are always proud of them. How then do the children come up with these drawings?

The initial step in making a drawing is the formation of a mental image in the child. Mental imagery has been best described by Piaget (1971). He called it "an active internalized reconstruction of perception". The image formed then undergoes certain mental processes after which it emerges as a drawn picture. It is the drawn product that enables us to read the child's mental imagery. The way children draw has been studied by various people and those reviewed here are the ones that have specifically looked at how the human figure drawing is produced.
Meili Dworetzki (1957) as reported in Harris (1963) did long term detailed observations of how children draw the human figure. Over 100 children, two to seven years old were observed in free and controlled settings. She asked a number of children to tell how to draw a man, what to draw first and so on. Most children listed only those parts that they themselves included in the drawings. Their oral descriptions and their drawings were almost identical. Older children, five, six and seven years old drew more parts than they mentioned orally. So Meili-Dworetzki realized a certain process that seemed to take place in the child's mind before drawing. Firstly the children seemed to develop an underlying graphic pattern for the human figure. Then the children became preoccupied with achieving a synthesis of parts which previously seemed unconnected. This is the structure that the child retained in the mind. Thus Meili-Dworetzki concluded that there was an interaction between perception and reproduction in drawing and that the two reinforced one another in the construction of concepts.

Meili-Dworetzki (1957) further observed that the child's awareness of her/his body seemed to follow a certain sequence: hands, feet, face and trunk with the head (face) and the vertical dimension dominating. The rest of the body or the lateral dimension came after the face. The older the children, the more the bodily parts they included in their drawings.
Similarly, Bassett (1976) determined the way children produced drawings of the human figure by carrying out a study in Britain. The mean age of children selected for the study was four years and nine months. The children were first presented with a drawing task (asked to draw a man) and then a construction task (asked to construct a man from six cut out parts). She found that in the construction task, all the parts would be placed in their right places, but when it came to the drawing, the children would treat each individual component (like the head, trunk and legs of the human figure in isolation. In the process of isolating each component, the children seemed to lose sight of certain features of the overall shape and those that they seemed to capture were the head and legs. Bassett (1976) thus concluded that in order to make a representational drawing of the human figure, the child must construct an image which must be perceived simultaneously and she/he must then break the image into separate components so that she/he may serially order the drawing of the parts on paper.

A certain amount of planning has to take place before producing a drawing on paper. Like Freeman (1976) had observed, the main problem in children's drawings was not so much an artistic problem but a planning problem and the plan made depended on the child's age and capabilities. So when children are given a pencil and paper and are asked to draw, they are restricted by the frames of the paper.
At the same time, they have to know when they are doing to discontinue the lines while drawing, in order to get what they intend to draw otherwise they may end up with long, continuous and perhaps meaningless lines. So the child needs to create order in her/his mind prior to the drawing. Drawings are therefore due to the powerful imagination of the child with everything so laboriously constructed.

Freeman (1976) was of the opinion that it was due to such like planning problems that the human figure drawing looked queer at first in its slow development towards a more realistic looking picture. Perhaps this may account for the 'tadpole' man (see Figure 2.1) drawings so common in the very young children.

**FIGURE 2.1**

**DRAWINGS OF THE HUMAN FIGURE IN TADPOLE FORM BY PRE-SCHOOL CHILDREN.**

(Source: Freeman (1976), pp 6)
In addition, motor development in children plays a role in determining the kind of drawings produced. Usually a conspicuous result of the child's rapid gain in motor control is seen in his growing ability and desire to do things for himself. The most noticeable changes are connected with co-ordination and balance and with the uses of the hands and fingers. In drawing, the handling of the pencil gets firmer with time. The scribbles and drawings made become smoother and the joining of the lines and curves become more accurate. All these changes depend on the child's maturation and they show the effect of age on drawing.

Burt (1921) analysed and described British children's drawings. He noted that because drawings were neither linguistic nor arithmetic, they gave access to the child's power of imagination and construction. He noted that the drawings got better in the number of items included and in the general appearance with increasing age. From these observations, he came up with five successive stages of drawing:

a) Scribbling: typical of 2 - 3 years, when pencilling is enjoyed as a motor expression;
b) Line: typical of 4 years, when in the drawing of a man, the parts are juxtaposed rather than organized;
c) Descriptive symbolism: typical of 5 - 6 years, where in the drawing of a man, the scheme
becomes apparent although there is little attention to shape or proportion;

d) Realism, typical of 7 - 9 years, where the drawing still symbolises rather than represents but the scheme is more true to detail;

e) Visual Realism, typical of 10 - 11 years, where the technique has improved so that the child can draw from nature and attempts visual representation.

Goodenough (1926) too, while analysing children's drawings in America noted that there were vast differences brought out in the drawings at different ages. For example, Figure 2.2 shows drawings of a man by bright, average and dull children of 5 years whereas Figure 2.3 shows drawings of a man by bright, average and dull children of 8 years.

FIGURE 2.2

DRAWINGS OF A MAN BY BRIGHT (A), AVERAGE (B) AND DULL (C) 5 YEAR OLDS

Source: Goodenough (1926 pp 32)
Figure 2.2 and 2.3 show that the drawings of the five year olds appear on average inferior to those of the eight year olds although in certain exceptional cases this may not be true. In this particular case, the bright five year old child (Figure 2.2 picture A) has performed distinctly better than the dull child of eight years (Figure 2.3 picture C) because the five year old has a distinct trunk with arms and feet properly attached in the appropriate places and with a head clearly shown as separate from the neck. These different body parts are not clearly shown by the dull eight year old child. In addition, even though the bright five year old (Figure 2.2 picture A) shows body parts similar to those depicted in the drawing of the bright eight year old (Figure 2.3 picture A),
the drawing by the bright eight year old is more realistic looking or more true to detail. The child has even gone further and attempted to draw the man in profile position. The bright eight year old would end up with a higher score than the bright five year old if the drawings were scored. Goodenough (1926) gave these illustrations to make clear the fact that the differences in ages may exist within the same age or within different ages. They further illustrate that the changes in the drawings are developmental, i.e., they do improve with increasing age.

Campbell (1957) carried out two experiments that clearly showed the difference in the performances of the various age groups. He carefully selected samples of children whom he grouped into age groups of three to nine years old with twenty children from each age group (140 children). In the first task, he showed all the children a simple face with two lines projecting below it. He found that over half of the three and four year olds and one fifth of the five year olds called these "legs". All the children six years and over saw the feature as a "neck". This seemed to indicate that the younger children (three, four and some five year olds) were at that level of perception of "attaching legs to the head". Their level of abstraction was such that they could not as yet perceive a whole body separated into a trunk and head. However, the older children were able to recognize the neck as the feature to be attached to the head and not the legs.
This thus clearly shows that the formation of concrete concepts very much depends on the age of the child.

In a second task, Campbell (1957) asked the children to copy a simple profile face. No three year olds, only a sprinkling of four year olds, about half of the five year olds but a large majority of the six and seven year olds and all the eight and nine year olds completed the task. These results indicated that a close relationship existed between comprehension and execution in the child. Campbell's two experiments clearly showed the differences in performance at different ages of children.

Court (1980) when studying Kenyan children's drawings found that definite developmental stages could be traced in the children's vertical and horizontal representations of the human figure. For drawing the human figure, she outlined the following four stages:

a) **Emphasis on the head**; typical of 3 - 4 years;

b) **Unit construction**; typical of 5 - 6 years where an attempt is made to include a trunk;

c) **Outline or contour**; typical of 6 - 7 years where the drawing represents but is not true to detail;

d) **True - to - appearance or visual realism** typical of 7 - 10 years.
It can be noticed that the Kenyan children, as shown by Court's (1980) study go through similar stages as the British children (Burt's (1921) work) and this is further evidence that the development in drawings is determined by the age of the child.

Children therefore form a mental image which undergoes a mental process that precedes the drawing. The drawings begin as unco-ordinated and meaningless lines but begin to take proper forms and shapes as the child gets older. Throughout the drawing process, the children are trying to make their mental images visible on paper which makes his/her level of perception very closely linked to his/her execution. A certain amount of organization in the mind (logical thinking) may determine why one child produces a more detailed drawing than another child of the same age so that we could infer a functional existence of a mental image from the drawing.

Background Of The DAP Test
And What It Measures

It has been shown in the previous section that the drawing of a human figure involves powerful imagination and a certain amount of psychological organization on the part of the child. This organizing may help differentiate between the highly intelligent from the less intelligent children.
"Intelligence" is a trait that human beings possess. The trait intelligence may have a number of components; i) the cognitive component which is the development of intellectual abilities and skills; ii) the affective component which is concerned with interests, attitudes, values and appreciations and iii) the psychomotor component or the motor skill area (Bloom 1956). It is not easy to find a generally accepted definition of intelligence. Various scholars have however attempted to define intelligence: Binet (1905), for example regarded intelligence as a collection of the faculties of judgement, practical sense, initiative and the ability to adapt oneself to circumstances. Terman (1921) looked at intelligence as that ability to carry out abstract thinking, whereas Goodenough (1926) emphasised on intelligence as being part and parcel of man's actions so that intelligence is a term used to characterize man's actions. She further stated that people are most intelligent when they respond to relationships between things to abstract ideas and generalize principles, not when they respond to single items that are only part of the situation. Thurstone (1938) a factor analytic theorist, extracted the following group factors or 'primary mental abilities' to try and define intelligence: verbal meaning, number facility, inductive reasoning, perceptual speed, spatial relations, memory and verbal fluency.
Harris (1963) in attempting to define intelligence replaced it with intellectual maturity or more specifically conceptual maturity. Harris did this to enable him to look at children's concepts of the human figure as an index of their concepts generally.

Intellectual maturity was defined by Harris (1963) as the ability to form concepts of increasingly abstract character. He described the process of concept formation as being:

a) The ability to perceive: the child should be able to discriminate likeness and differences in objects;

b) The ability to abstract: the child should be able to classify objects according to such likenesses and differences and form classes;

c) The ability to generalize: the child should be able to assign a newly experienced object to a correct class according to the discriminated features, properties and attributes.

Harris' (1963) definition is similar to Goodenough's (1926) who regarded the more intelligent person as the one who is able to respond to situations with abstract ideas and by generalized principles.

The DAP test thus gives a score that is expected to indicate how the child perceives the human figure at the time of making the drawing.
What the child draws would be an indicator of her/his intellectual maturity because the drawing will depend on the abstraction level of the child at that given time and hence she/he will be drawing the concepts she/he has formed and thus what she/he knows.

Harris (1963) further stated that the older child would discern and be able to specify properties of the human figure in greater detail than the younger child. The older child would form more specific and precise concepts and would thus be at a higher level of abstraction and subsequently have a higher level of conceptual maturity. Harris' (1963) work is the core of this study and his definition of intellectual maturity was adopted for this study. The DAP test is therefore, a test that is expected to show the child's ability to perceive, the child's ability to abstract and the child's ability to generalize objects around him.

There have been many attempts to measure the trait intelligence and especially in the early part of this century by scholars like Binet (1905), Thorndike (1926), and Cattell (1944). Goodenough (1926) like her contemporaries was interested in measuring intelligence. In an attempt to device a scale for this purpose, Goodenough (1926) set certain criteria. She wanted a subject that all children were equally familiar with and one which
presented as little variability as possible in its essential characteristics. Secondly, she wanted a subject that was simple in its general outline so that even very little children would be able to attempt it, yet sufficiently complicated in its detail to be able to tax the abilities of older children. Thirdly, she was looking for a subject that was of universal interest and appeal in order that motivation be maintained among the children.

She chose the human figure drawing as representing all the required factors. She then devised a scale for measuring intelligence which involved the drawing of a Man. This scale became known as the Goodenough Draw - A - Man Test (DAM 1926). A drawing of a Man was chosen for the original scale as a Man was considered a more suitable subject for the test than a Woman due to the greater uniformity of man's clothing.

The DAM was based on the idea that the more complete and realistic the appearance of the figure of a Man that the child draws, the higher the level of abstraction, and therefore the greater the intelligence of that child. According to Goodenough (1926), the child would have acquired abstract ideas and generalized principles to enable her/him to draw a Man.
Not much work was done as a follow up of the DAM test between the time of its inception and the 1950's. The next piece of work that was closely related was that of Harris (1963) who revised the DAM scale. The revision was necessitated by a renewed interest in children's drawings as from the second half of the twentieth century, when the DAM was largely used to assess the intellectual maturity of children. The early DAM had been found to have certain shortcomings as an instrument for measuring intellectual maturity. A call was thus made for a revision and an establishment of new norms.

Some of the shortcomings noted in the original scale were that no arbitrary decisions were made as to what constitutes intellectual merit in a drawing; and that the standard subject matter and directions for drawing were chosen but to allow as much freedom as possible in working out the task, no further specifications were made as to how the drawing should be done. Harris (1963) thus embarked on revising the DAM scale with an attempt to do the following:

i) To extend the test to cater for the adolescent years;

ii) To explore new items that could increase the reliability and validity of the scale by sampling different aspects of cognitive ability;
iii) To develop extended or alternate forms of the scale;

iv) To develop a basis for possible projective uses of the scale.

Harris' (1963) modification of the Goodenough DAM (1926) scale included the drawing of a woman and the self. The new scale became known as the Goodenough-Harris Draw - A - Person Test (1963) in which children were expected to draw a picture of a Man, a Woman and the Self in that order in a test booklet. Harris' (1963) scale isolated 73 points (items) for the Man drawing and 71 points (items) for the Woman drawing for scoring purposes.

DAP Test - Reviewers' Comment And Summary

The DAP test was adopted for this study due to its simplicity, applicability and practicability. The Test is easy and simple and can be used by any teacher. It being a non-verbal test makes it very suitable for young children who may lack in reading and verbal fluency. It can be easily and objectively scored. All that would be required would be to train the scorer and with a little practice they can become efficient. In addition because the children draw a person as they perceive her/him, the test is a culture free one.
The administration of the test is easy, takes a short time and has short clear instructions.

The DAP test was thus proposed to provide teachers, parents, educational planners and psychologists with a measure of intellectual maturity which would help to select those children who should receive more detailed/specialised attention. Such a selection needs to be done as wisely as possible.

The DAP test is a test of how the child perceives the human figure at the time of drawing. The child's inductive reasoning, memory, perceptual speed and spatial relations are brought into play. In the test the child is being asked to abstract those qualities of the human figure that are essential to the figure's identification and draw them. How well the child will draw and how much detail she/he will include will be an indicator of how well she/he is able to perceive the human figure. This in turn would be an indication of the child's intellectual development.

The drawings of brighter or more intellectually capable children are not necessarily more artistic but they would excel in such matters as:

i) the number of details (items) included in the drawing,

ii) the correctness with which parts have been assembled,
iii) relative proportion of the different parts,
iv) the control of the eye and hand movements as shown by the regularity of the lines and the smoothness of their joinings.

With that in mind, the DAP test was scored along the following lines:

1. the presence of all body parts,
2. the details included in the body parts,
3. the movement of the figure,
4. whether the drawing is in proportion,
5. motor co-ordination,
6. modelling and sketching techniques.

(Details can be found in Appendix H)

From these assessments it can be deduced that the child's cognitive and motor development go hand in hand and play a big role in the synthesis of the parts on paper to form a whole drawing of a person. This drawing can be an indication of the child's mental ability level. Information regarding the child's mental ability is vital for the child's future performances. The DAP test is thus important as it can give this information.
THE EMPIRICAL FRAMEWORK OF THE STUDY

This section shall review previously conducted studies related to this study. The studies are reviewed under the headings of the variables investigated in this study.

Drawing Ability And The DAP Test Scores

The previous section has shown how the child's drawing reflects her/his cognitive development and also that perhaps the level of perception and the logical thinking in the mind of the child make one child do better than another of equal age. But in considering the drawing ability in children, Goodenough (1926) did a lot of careful research into children's drawings in a search for talented child artists. Artistic talent here refers to the stylistic, expressionistic and aesthetic qualities that would be found in drawings. Goodenough (1926) was unable to locate a single child under the age of twelve years whose drawings appeared to possess an artistic merit that would be comparable to the musical genius occasionally shown by children of this age. She therefore concluded that 'artistic' talent was not evident in children below twelve years even though other talents like those in music could be clearly discerned. The artistic talent, as most scholars came to conclude (Harris 1963)
did not become evident until after the age of about ten years.

Court (1980) carried out a pilot study on the developmental drawing characteristics of selected Kenyan children between three and eight years. She found that the qualities of stylistic, expressionistic and aesthetic qualities were rarely seen in the pilot study sample drawings and therefore she did not find them important dimensions on which to analyze the drawing development of children.

Perhaps then, drawing becomes an aesthetic expression for those older children, adolescents and adults who have developed a measure of skill and can use it to communicate their concepts of design, arrangement, balance and composition. In the younger child, these aesthetic concepts may be formed but are at a rudimentary level so that for them (the younger children) drawing expresses feeling at the motor expression level. We ought to remind ourselves here that the DAP test is based on perceptual and motor skills and so when observing scores obtained by children on the DAP test, the high scores obtained may be as a result of "keen powers of analytic observation coupled with a good memory for details as opposed to artistic ability in the ordinary sense of the word".
Art instruction/coaching may, to begin with, appear to have an effect on the DAP test scores. Various studies have thus been conducted to determine whether this is so. Goodenough (1926) carried out an experiment in which she used 37 American children from a first grade class (5 - 6 years). First of all, a control drawing of a man was taken from each child. Then direct coaching according to the method used for scoring the test was given for half hour periods of teaching and practice on two successive days. A second drawing was obtained on the second day of coaching and a third drawing a week later. The control drawing had a median score of 16.7 points, second drawing 19.2 points and 23.7 points on the third drawing. A comparison of the control drawing with final drawings showed that 70 percent of the children had gained at least one point, 8 percent showed no gain or loss and 22 percent showed only a slight loss. This data showed that at least in the majority of cases, specific training in drawing the human figure did affect the score on the DAP test. There is however, no evidence that the kind of teaching which was most commonly given in the primary grades and which did not include formal instruction on the human figure had any appreciable effect upon the score.

Burns (1977) also assessed the effect of ordinary school art instruction in human figure drawing on scores of the DAP test in Rhode Island (America). Subjects consisted of 44 fifth grades
(8 - 9 years) attending a sub-urban parochial school who were members of two randomly assigned classes. Both classes were taught two lessons in art by their regular teachers. The treatment group was taught human figure drawing while the control group had art lessons excluding human figure drawing instruction. The drawing test was administered three times; one pre-instruction and two post-instruction administrations. As had been predicted by Burns, no differences were found in the control group between pre and post tests but the treatment group showed significant gains on both post tests as well as significant decline from the first post test to the second. This would seem to suggest that the improvement of the score obtained on the DAP test after coaching on the human figure is a temporary one. The effect is minimized with the passage of time.

In a yet more recent study, Kifune (1983) looked at the effects of presenting human figure information on pre-school children's DAP test scores. In this study, 120 children of 3, 4 and 5 years in Japan were tested. Some received Human Figure Information (HFI) where they were taught according to the method used for scoring the test and a second group had no HFI. The two groups were retested on the DAP test immediately, one week and one month after the presentation of the information. The results indicated that HFI increased DAP test scores with the effects declining over time and these findings were similar to those of Goodenough (1926) and
Burns (1977). However Kifune's (1983) suggestion that the DAP test was invalid due to the effect of the HFI on the scores may not quite hold true. The teaching given in the ordinary classroom setting would not have appreciable effects on the DAP test score.

It can thus be deduced from these studies that the usual art instruction given in the lower primary school is not an intentional teaching on the human figure drawing and as such it should not affect the score obtained on the DAP test. It should also be noted at this stage that in the new '8-4-4' school syllabus in Kenya, art instruction in the lower primary school is not given much emphasis on the curriculum. For these reasons the DAP test cannot be discredited as one that would give a biased score either based on the child's artistic talent or based on the classroom instruction but rather a score that would differentiate children's mental abilities by how much detail they put into the drawing of the human figure and how realistically in appearance the drawing is portrayed.

Age And Sex Differences On The DAP Test Scores

The DAP test has different tables for boys and girls due to certain sex differences that were evident in the human figure drawings.
The differences are noticed at varying age levels and so they are best looked at in terms of the age at which they occur.

When Goodenough (1926) was standardizing the original DAP test, she noted a rather noticeable superiority of girls on the drawing test at every age except 12 years (the ages ranged from 3 - 15 years). She had randomly selected children to represent a wide range of social status and ethnic background and then carefully selected 100 drawings drawn by these children. Goodenough (1926) noticed that the boys at all ages tended to exaggerate the size of the feet and the length of the arms as compared with the girls tendency to minimize these parts and this seemed to be in line with the fact that more often the boys' drawings show the figure in action. Perhaps this also accounts for the fact that the boys' figures changed from full face to a profile position earlier than the girls. Goodenough (1926) further noticed that the girls were inclined to exaggerate the size of the head and the trunk and more especially of the eyes. In general Goodenough found that the sense of proportion displayed by the boys was decidedly better than that shown by the girls while the girls excelled in the number of features drawn and the amount of detail with which these items were shown.

Willsdon (1976) too looked at some sex differences in a study of human figure drawings.
He obtained a human figure drawing from six hundred and thirty four boys and six hundred and eight girls aged 4½ to 7½ years in infant and junior schools in Britain. The instructions given to the pupils were "Draw someone; it can be yourself or mummy or daddy or someone you know. Make the best drawing you can". Each drawing was scored and the results processed for computer analysis. One aspect that showed interesting results concerned the different achievements of the boys and girls. Willsdon observed that there were marked differences between the boys and girls in terms of the ages at which they first produced various features of the human figure in their drawings. One observation was that although both boys and girls between 4½ and 7½ years drew a person with a distinct trunk, it was the boys who persistently drew the less mature style of the 'tadpole' man and they did so for some six months longer than the girls. The girls introduced a waist into their drawings some six months before the boys. Most children drew eye lashes and eye brows after they were six years. The ears however, seemed to appeal more to the boys than the girls. Between the ages of 6½ and 7½ years, the teeth were popular in the faces drawn by the boys. Once the children began to show their features as having a distinct trunk, double lines for legs were introduced by the girls at least as early as 4½ years which was six months ahead of the boys. In the use of double lines for arms, the girls were as much as twelve months in advance of the boys.
Willsdon (1976) also observed that girls' drawings showed a greater number of features (for example the head, eyes, eyebrows, pupils, hands, thumb). Sex differences in the performances of boys and girls are expected as the upbringing of boys and girls in our society tends to differ. The boys were traditionally expected to be 'heads of families' whereas the girls were expected to be housewives/mothers and so the two groups underwent different training programmes in preparation for their future roles. The varied experiences would affect the perceptual ability of the girls and the boys. The girls who predominantly have dolls for toys and who perform chores that involved articulate counting and accuracy would certainly be expected to perceive the human figure differently from boys whose main preoccupation may be hunting, running and the like. Perhaps this may account for the findings by Goodenough (1926) that girls put more details into their drawings and also the finding by virtually all investigators of this area that the boys almost always want to draw the figure in action or in perspective. We cannot also overlook the fact that generally, girls tend to mature faster than the boys. Upbringing therefore plays a big role in the kind of performance produced by the boys and girls on the DAP test. Goodenough (1934) had the correct opinion that even the small sex differences shown by certain tests in regard to the pattern of abilities are quite as much as
the result of the differences in interests, in play experiences, and the like which are initiated and fostered by the particular kinds of toys and activities deemed suitable for little boys and girls.

The sex of the pupil would therefore be expected to be reflected in the DAP test scores obtained by the pupils. The girls would be expected to excel in certain areas and boys in others and the ages at which these differences occur would vary too. That being the case, Sex was deemed as an important and interesting independent variable to be examined.

**Socio-economic Status And The DAP Test Scores**

Other than the Age and Sex of the pupil, the socio-economic status of the child could have an effect on the score obtained on the DAP test. The socio-economic status of the child would be the background of the child which may be reflected in the family income, type of school attending, the nutritional status of the family, and may be the parents' level of education. A number of studies have been done in this connection some of which are here reviewed.

Kagiticibasi (1979) administered the DAP test
to 218 pupils in third grade (about 8 years) from rural and urban areas of Turkey with an aim of looking at the effects of socio-economic development on the DAP scores. The three rural villages varied in their degree of remoteness from the city and in their level of 'modernization'. The urban children belonged to lower and middle socio-economic status groups. From the results, the rural subjects from the most remote village had the lowest scores and the urban middle class subjects had the highest scores. These results indicated that the level of socio-economic development was the main factor explaining the variation in the obtained scores on the DAP test. It is generally believed that children in the lower socio-economic status group are deprived of the environmental and intellectual stimulation that is accorded to those in the upper or higher socio-economic status group. Thus the geographical location, according to this study, has an effect.

In yet more work, Scott (1981) critically evaluated literature on the DAP test up to 1979 and the areas that she covered were the administration and standardization of the Man and Woman scales, sex differences, reliability, criterion validity, validity with measures of academic achievement, cultural variables and use with the learning disabled and mentally retarded. Her conclusions were that the test was a reliable measure for children between five and twelve years
and the socio-economic status of the child was found to exert a more powerful effect on the DAP performance than race, geographical location or size or place of residence.

Oakland (1983) also found that the socio-economic status seemed to affect performance on the DAP test. He was interested in the extent to which the DAP test yields a non-biased assessment. He examined the psychometric and conceptual issues associated with the use of the DAP test using 188 children of eight to ten years from three ethnic groups (Anglo, Mexican-American, and Black) and two socio-economic set ups (middle and lower). Subjects were administered a battery of five instruments including the DAP and the Weschler Intelligence Scale for Children - Revised (WISC - R). The findings indicated that the child's ethnic background was unrelated to performance on the DAP test but the socio-economic status seemed related to the performance on the DAP.

These studies indicate that the socio-economic status of the child would affect his conceptual maturity (as measured by the DAP test) with those from the poorer, deprived home backgrounds performing poorly. The family's level of income seems to be a more powerful determinant of the child's performance since it will determine her/his nutritional status, the type of school she/he will be able to attend and the lesser the
income, the poorer the quality of school the child will attend. Court (1980) had found that the drawing level of children was affected by school location when in her study; the children in urban schools performed better than those from rural schools.

The type of school that a pupil attends was given emphasis in the present study as being a reflection or an indication of the child's socio-economic background. This is derived from the fact that children from the well-to-do families will attend the better quality schools as they can afford the fees charged in those schools but those from the poorer families would go to the poorer schools which don't charge any fees. Hence the school attended is a proxy measure of the socio-economic status of the child.

School Academic Performance
And The DAP Test Scores

The present study was interested in investigating whether school academic performance would be correlated with the DAP test scores. Ohuche and Ohuche (1973) were also interested in this problem and so they tried to look at the DAP test as a predictor of academic achievement in Sierra Leone. They did this by examining the relationship between results obtained on a
teacher made examination. Two hundred and two Njala children, five to eight years were given both tests and the correlation coefficients between the DAP test and the end of year promotion exams ranged from +0.3 to +0.66. Ohuche and Ohuche concluded that the DAP test is a predictor of academic achievement in Sierra Leonian children in the first three years of primary school. They further suggested that in the higher grades of school (after 8 years) the DAP test does not differentiate among pupils and therefore does not predict their school achievement.

Court (1980) was also interested in the effect of academic performance on drawing level and drawing characteristics. She found that the drawing level was positively correlated with academic ability which was the teacher's assessment of the child's school work scored on a 1 - 5 point scale.

In a manner similar to Court's (1980) this study obtained school academic performance by the pupil from a Teacher's Rating of the pupil on a 1 - 5 point scale. This rating would give a fairly global score of the child's academic performance would be affected by the type of school they go to as the facilities in the schools vary so much and hence the Effect of School is an important variable to be observed.
Multivariate Studies

King (1975) carried out a study that was interested in the application of the drawing of the human figure as an underlying index to cognitive development, cultural emphasis and social group values in Texas, U.S.A. She used 120 children who were in attendance in the normal classroom. Subjects of the study were matched according to:-

i) age below 9 years,

ii) age below 11 years,

iii) native born Mexican American,

iv) native born Anglo-American.

Sixty subjects were Mexican American while another sixty were Anglo-American and they were matched according to age level and sex. Human figure drawings of a Man, a Woman and the Self were collected from these children.

A variety of empirical procedures were employed in order to ascertain cultural differences between ethnic groups. As indices to cognitive development and the influence of cultural variables upon the manner in which children sexually differentiate the male and female drawings, the DAP test and the Hawthorn and Normington Sexual Differentiation Scale for children were employed. As an index to ascertain social group values, Dennis' scale of content expressions was utilized.
A 30 word checklist was devised in order to explore the impact of the stimulus properties of the drawings upon interscorer reliability.

Results of this research indicated that of the three independent variables (age level, sex, ethnicity) only age level and sex represented any appreciable relationship to the obtained correlations with dependent variables (cognitive development, culture and social group values). Ethnicity by itself did not contribute anything when the relationship between ethnicity and the dependent variables was examined. So the ethnic background of the child did not have an effect on the score obtained. At the same time, the obtained results did not give any evidence of the girls exceeding the boys in cognitive level.

Court (1980) carried out a study to determine the developmental drawing characteristics of selected school-attending Kenyan children aged three to eight years in Nairobi and Kiambu. Although the study was approached from an artist's point of view, the findings are of interest to this study. In Court's study, an analysis to determine the developmental drawing level were carried out on two dimensions of spatial usage and human figure construction. The author deviced scales to measure the score assigned to the drawings. For spacial usage, an attempt to show perspective for particular
items and the use of schematic devices like transparencies were looked for whereas for the human figure, the amount of detail used for specific body parts, an indication of the sex of the figure and the use of the profile view were looked for.

The pilot study (Court 1980) examined some of the factors which had affected the developmental drawing level and the drawing characteristics of selected Kenyan children. Chronological age, gender, location of school and teachers' assessment of the child's academic ability were considered. The findings were that the drawing level was strongly dependent on age; drawing performance improved with age; drawing level was independent of the sex of the child; drawing level was affected by school location; drawing level was positively correlated with academic ability and drawing content was developmental.

King's (1979) study therefore had results similar to that of others (Goodenough 1926, Willsdon 1976) that sex and age could have an effect on the DAP test scores although in her case, she did not have evidence of girls being better than the boys in their performances. Similarly Court (1980) found that sex, age and school location, could affect scores obtained in drawing a man. She further found that drawing was developmental in nature. This study was conducted using Kenyan
children but the results are similar to those found using children elsewhere - like America, Britain. Hence children's drawing of the human figure may have certain universally recognized characteristics.

**Relationship Between The DAP And Other Tests Of Intelligence**

Rottersman (1950) in an unpublished masters' thesis reported correlations between the DAP test and the Weschler Intelligence Scale for Children (WISC) of six year olds and found the following correlations: verbal scale + 0.38, performance scale + 0.43, full scale + 0.36. Ansbachen (1952) compared the DAP test with the Thurstone Primary Mental Ability Test and the correlation was negligible.

White (1979) examined the relationships between the WISC - R, Peabody Individual Achievement Test (PIAT) and the DAP test. Using data from thirty 7 to 11 year olds, moderate to high correlations were found when standard scores correlated moderately with PIAT and WISC - R score. Data indicated that information yielded by the PIAT may be obtained through WISC - R results while the DAP test may be tapping abilities not adequately assessed by either of the measures.
Validity And Reliability Of The DAP Test

The DAP test has been found to be a valid and reliable test by various researchers. Evans (1975) for example examined three reliability characteristics: stability same tester, stability different testers and marker error of the DAP test when used with five year old school entrants. The test was individually administered to 90 subjects (5 years) on two occasions with an average time separation of two weeks. Three persons administered and scored the drawings and the three reliability coefficients were examined. Results indicated that when experienced testers were used, the reliability of the scale was of the same magnitude as that reported involving older children, six years and above. It was also suggested that with school entrants the influence of different trained testers on the final rank order of the scores was probably quite small.

The results further showed that with drawings of the five year olds, there was likelihood of the scorer developing a consistent subjective marking standard than is the case with drawings of older children. Evans therefore considered the test as being more useful for the comparison of groups than for individual school entrants.

Polifka (1979) did another study that was a factor analysis of children's human figure drawings.
The study was designed to investigate the relationships among selected intelligence, visual perception, visual motor and personality measures and to determine the factors, based on these relationships which account for performance on the Draw - A - Person Test.

The WISC-R subtests and Slosson Intelligence Test were used as measures of intelligence; the Bender Gestalt and Frosting subtests as measures of visual perception and visual motor ability and the Piers-Harris children's self concept subtests, Junior Eysenck Personality Inventory Scales and Koppitz's Emotional Indicators on the DAP test as measures of personality.

Fifty children, 7 to 9 years old served as the subjects in second and third grades in a rural university town of Southeastern South Dakota. The WISC-R subtests, Slosson Intelligence Test and the Bender Gestalt were administered to the subjects individually while the Frosting subtests, Piers-Harris subtests, Junior Eysenck Personality Inventory and Draw - A - Person were administered in a group setting with four to six subjects in each group.

Pearson Product Moment correlations were computed to ascertain the relationships among 27 variables like general intelligence, visual perception and visual motor ability and psychomotor
co-ordination. The resulting correlation matrix was used as the input data for the subsequent factor analytic procedures. The following factor analytic procedures were used to determine the underlying factors of the DAP test:

1. Alpha Factor Analysis with Varimax, Quatrimax, Equimax and Oblique rotations were used in an attempt to maximize generalizability to common factors in the whole universe of intelligence, visual perception, visual motor ability and personality tests.

2. Rao's Canonical Factor Analysis with Varimax, Quatrimax, Equimax and Oblique rotations were used to find a set of linear components of the observed variables that were maximally correlated with a corresponding set of linear components of the above factors - intelligence, visual perception, visual motor and personality tests.

3. Maxplane Oblique Transformation Method was used to rotate the factor axes in such a way that the maximum number of variables fell within a specified area of the factor axes.

None of the loading from the Draw - A - Person Test exceeded 0.56, but the data indicated that the DAP test loaded primarily on general intelligence factors which received the highest loadings from
variables which measure verbal and non-verbal concept formation. The DAP test also loaded on visual perception and visual motor ability factors which appeared to reflect the ability to discriminate the figure from background and psychomotor co-ordination. Neither DAP nor Koppiltz's emotional indicators on the DAP test loaded on factors which contained predominantly personality variables. It was hence concluded in this study that the DAP test could be utilized to obtain an estimate of mental ability in a relatively short administration time.

McMillan (1980) in yet another study compared the performance of gifted and unselected children aged 5 - 6, 7 - 8 and 9 - 10 years on the DAP test. He found that the human figure drawings made by these two groups differed significantly on some dimensions. Three items (proportion of arms on the drawing of a Man, shoulders on the drawing of a Woman and dress of a definite type on the drawing of a Woman) were significantly (p ≤ 0.05) more suitable to be found in the drawings made by the intellectually gifted: only "cheeks" on the drawing of a Woman were significantly more suitable to be found in the drawings of the unselected group.

Evans (1975), Polifka (1979) and McMillan (1980) conducted studies that indicated the reliability and validity of the DAP test in their areas of operation.
The present study aimed at validating the use of the DAP test for the Kenyan situation.

Summary of Literature Review

The review of literature has made the intervening variables surrounding the DAP test much clearer. It is of interest to note how much effect the socio-economic background of the child has on the obtained DAP score. Kagiticibasi (1979) and Scott (1981) reported this finding.

It has also been discussed how the kind of art instructions given in the school and do not include formal teaching on the human figure should not have any appreciable effects on the DAP score obtained. However, specific information on the human figure given to the children does increase the DAP score obtained but that human figure information declines over time (Goodenough 1926, Burns 1977, Kifune 1983). However, differences in intellectual maturity as opposed to special artistic talent would be responsible for the performance on the DAP test.

The question of Age and Sex has received much attention with interesting results. Many studies carried out like that of Goodenough (1926), King (1975) and Willson (1976) which observed the performances of the boys and girls on either the DAP test or the human figure drawing have shown vast
differences by the different sexes at almost every age. The interesting question that arose was whether girls were actually superior to the boys as far as intellectual maturity was concerned.

Girls and boys of the same class receive the same teaching and equal attention; so perhaps there are other factors like interests that may account for the differences on the DAP test. Thus the boys and girls of the same age should be able to score similarly on the DAP test.

Null Hypotheses

The following null hypotheses were subsequently derived from the review of literature:

1. There is no significant relationship between the DAP test scores and the Age of the pupil.

2. There is no significant relationship between the DAP test scores and the Sex of the pupil.

3. There is no significant relationship between the DAP test scores and the Teachers' Rating of the pupil.

4. There is no significant relationship between the DAP test scores and the effect that school has on the pupil.
The next chapter shall be concerned with how the study was designed in order to achieve the aim of validating the use of the DAP test in Kenya. The research questions and the null hypotheses were used as a guide in setting up a design. Chapter three therefore presents the methodology of the study, the sample selection, data collection procedures and the data analysis methodology.

**Research Design**

This was a cross-sectional study across several groups (4-5 years) of children. The subjects for the study were from the lower primary schools in wards 1, 2, 3, 4, and 5. In order to achieve the objectives of a balanced design, three main primary schools were randomly selected and two classes were randomly selected from each school, then the DAP test administered to all the children from these classes. The children were randomly selected from each classroom. The results were then analyzed and the children statistically analyzed in order to validate the sample. The sample was an urban one comprising of several primary schools excluding private schools in the area.
CHAPTER III

RESEARCH METHODOLOGY

In this chapter, the sample selection, instruments, procedures used and the data analysis techniques are described. The study was designed to attempt to answer the research hypothesis in Chapter II with an aim of validating the use of the DAP test as a measure of intellectual maturity of young children in Kenya.

Research Design

This was a cross-sectional study across various age groups (6 - 9 years) of children. The subjects for the study were from the lower primary classes - standards I, II and III. In order to satisfy the conditions of a balanced design, three stage random sampling was carried out: firstly, two type 'A' and two type 'C' primary schools were randomly selected; secondly, 12 classes were randomly selected from the streams and the DAP test administered to all the pupils from these classes; and thirdly scripts were randomly selected from each classroom. The drawings were handscored and the scores statistically analysed to be by a computer. The sample was an urban one restricted to City Council primary schools excluding private schools in Nairobi.
The Preliminary Study

A preliminary study was conducted with the following objectives:

1. To verify the clarity of the test administration instructions given on the standard DAP test booklet.
2. To verify the scoring procedure to be used for the drawings.
3. To ascertain whether three drawings would be required from each pupil.
4. To obtain a rough estimate of the length of time the test administration would take.

Forty four pupils (20 boys and 24 girls) from standard I, II and III and whose ages ranged from six to nine years (mean age 7.5 years) were the subjects for the study. They were selected with the help of the class teachers and every attempt was made to get as representative a sample as possible. The school used for the study was a city council one and was very similar to the schools that were to be used in the actual study.

All the 44 subjects were administered the DAP test in one group session in the morning. The drawings were then hand-scored and analysed (see Appendix B for results).
The analysis of the study established the following:

1. The instructions given on the DAP test booklet were adequate and the pupils had no problems in understanding them.

2. The scoring procedure was found to be adequate. The procedure did not have any ambiguous instructions. It could be easily used to score the drawings obtained from the pupils. The instructions given for scoring each item were clear.

3. The mean scores of the pupils tended to vary (see Results in Appendix B). For example, on the drawing of a Man, the six ($\bar{x} = 13.0$) and seven ($\bar{x} = 13.4$) year old boys performed better than eight ($\bar{x} = 12.0$) year old boys. On the drawing of the Self by the boys, the six ($\bar{x} = 21.5$) year olds had higher mean scores than the seven ($\bar{x} = 18.8$) and eight ($\bar{x} = 18.8$) year olds. The six year old girls performed better than the seven year olds on the Woman and Self Scales. Therefore in the absence of a clear pattern regarding the performance of pupils on the DAP tests it was decided to ask for three drawings for the actual study. It was also noticed during the preliminary study that the children were willing to attempt the three tasks in one sitting — it was not beyond their capacities.
4. The test was found to take between twenty and twenty-five minutes.

Based on the above findings, no alterations were made and the Harris (1963) DAP test booklet and scoring procedure were adopted for the actual study.

Description Of The Population

The sample for the study was drawn up from Nairobi Province. Nairobi Province is slightly different from the other provinces of Kenya in that Nairobi doubles up as the capital of Kenya and this makes it an urbanized Province. There are 135 primary schools in the province that are either fully maintained or assisted by the City Commission's Education Department. The province also has private schools. The various categories are shown in Diagram 3.1
The City Commission schools are categorized into type 'A', 'B' and 'C' schools. In 1985 there were 90 type 'A', 35 type 'B' and 10 type 'C' co-educational primary schools. These categories were introduced during the colonial rule when Nairobi had European primary schools ('C' type) to cater for the European children, Asian primary schools ('B' type) to cater for the Asian children and African primary schools ('A' type) to cater for the Africans. After independence, these schools were slowly absorbed into the local government but still maintained the 'A', 'B' and 'C' categorisation. Type 'A' and 'C' schools being the two extremes were selected for the purposes of this study. They are further discussed below.
Type 'A' Primary Schools

Before independence Africans received very basic education and so the type 'A' schools that were inherited by independent Kenya were very poorly equipped and provided very limited facilities. These schools are maintained by the city council through a government grant as the pupils do not pay fees. Hence they are sometimes referred as the low cost schools. The children that go to these schools, therefore, are from the poor families.

In spite of all primary schools using a similar curriculum, the performance of these schools in national examinations has remained below average. Very few, if any, extra curricula activities are offered to the pupils due to the financial implications involved.

Type 'C' Primary Schools

The education accorded European children was of very high quality and so the 'C' type schools were very well equipped with numerous facilities and resources at their disposal. This was inherited at independence and these schools became known as the high cost schools since the children going to these schools continued to pay high fees. However, these are today assisted by the city council and the fees paid ranges from 400/= to 600/= per term per student. Therefore it is the parents that can afford the fees that take their children to these schools.
Most of the 'C' schools have consistently performed above average in the national examinations. Academic work is emphasised in these schools but the pupils also engage in a lot of extra-curricula activities like drama, educational visits/tours, that are intellectually stimulating.

Since these school types are so strikingly different in terms of facilities, resources available and the kind of pupils that attend them, it was decided to use them in this study. Subsequently, two type 'A' and two type 'C' primary schools were randomly sampled.

Sample Selection

In an attempt to get a balanced sample, a three stage random sampling was carried out. In the first stage, two type 'A' (Dr. Krapf Primary School and Madaraka Primary School) and two type 'C' (Nairobi and St. George's Primary) were randomly selected from a total of 90 'A' schools and 10 'C' schools.

In the second stage, one class per stream of standard I, II and III in the above four schools were selected randomly. Thus a sample of 12 classes with a total number of 512 pupils was obtained. The mean class size was between 43 and 45 pupils. All the 512 pupils were administered the DAP test.
In the third and final stage, 30 drawings were randomly selected from each of the 12 classes tested. The final sample thus consisted of 360 pupils - 120 from each standard I, II and III. Table 3.1 further helps explain the nature of the final sample.

**TABLE 3.1**

**DISTRIBUTION OF THE FINAL SAMPLE**

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>Std I</th>
<th>Std II</th>
<th>Std III</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>120</strong></td>
<td><strong>120</strong></td>
<td><strong>120</strong></td>
<td><strong>360</strong></td>
</tr>
</tbody>
</table>

**Instruments For Data Collection**

The independent variables for this study were the Age and Sex of a pupil, the School Type and the Teachers' Rating of the child.
The Age of the child was obtained from the cover page of the test booklet and this information was verified against the school records. An age of between five years and six months and six years and five months was taken to be six years as recommended by Harris (1963). The ages of the children sampled for this study ranged from six years to ten years with a mean age of eight years. The ages were distributed as follows: 38 pupils were six years, 116 pupils seven years, 101 pupils eight years, 95 pupils nine years, 9 pupils ten years and one pupil twelve years.

Similarly, the Sex of the pupil was obtained from the cover page of the test booklet and this was once more verified against the school records. There were 173 girls and 187 boys in the final sample. The name of the school was also indicated on the cover page of the test booklet.

Finally, the class teachers were asked to give a rating of the pupils on a five point scale which gave the child's global score. The five point scale was broken down as follows: Excellent - 5 points, Good - 4 points, Average - 3 points, Fair - 2 points and poor - 1 point. The Teachers' Rating would be an indication of the child's academic performance.

Various studies showed reliability and validity of the DAP test. Harris (1963) observed evidence of reliability of the DAP test as intercorrelations between scorings generally ranged from 0.80 to 0.90.
Further in an unpublished study Harris (1963) trained two undergraduate students briefly in scoring the test. The two students independently scored the test. The following intercorrelations were obtained:

<table>
<thead>
<tr>
<th></th>
<th>8 YEARS</th>
<th>10 YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BOYS</td>
<td>GIRLS</td>
</tr>
<tr>
<td>Man Scale</td>
<td>.92</td>
<td>.97</td>
</tr>
<tr>
<td>Woman Scale</td>
<td>.94</td>
<td>.91</td>
</tr>
</tbody>
</table>

These results indicated a high level of agreement between the scoring of briefly trained scorers.

The reliability of the test was further evaluated through the study of scorers' agreement item by item. Harris (1963) reported correlations of as high as .60 and .70 between the scores of children's drawings separated by a time interval of as much as three months.

Evans (1975) examined three reliability characteristics of the DAP test and concluded that when experienced testers were used, the reliability of the scale was of the same magnitude as that reported involving older children 6 years and above.
The results further showed that with drawings of the five year olds, there was less likelihood of the scorer developing a consistent subjective marking standard than is the case with drawings of older children. This study is reviewed in detail in chapter II.

Polifka (1979) carried out a factor analysis of the DAP test. The results he obtained indicated that the DAP test loaded primarily on general intelligence factors and this was evidence of the validity of the DAP test. This study is also reviewed in detail in Chapter II.

The Draw – A – Person Test

As has been discussed in the review of literature the original DAP test as devised by Goodenough (1926) involved the drawing of a Man. Harris (1963) revised this scale five times within which time he included more items for scoring and also added the drawings of a Woman and the Self.

The data to be collected for the DAP test was a drawing of a Man (DAPM), a Woman (DAPW) and the Self (DAPS). The test booklet (see Appendix C) from the standard manual on the DAP test was used for the study. The Man (M) and Woman (W) point scales from the Harris (1963) Test Manual (see Appendix F) were used for scoring the items on the
human figure drawings. Seventy three items on the M scale and seventy one items on the W scale were looked for and scored. The Self drawings were scored using either the M scale for boys or the W scale for girls. A credit point of one was allowed for each pass with no half credits given. A raw score was then obtained by adding the number of credits awarded to each drawing.

Data Collection

The DAP tests were administered under regular classroom conditions. The testing took one day per school and the whole exercise took four days. The test was given in one group session per class in all the twelve classes.

The pupils were issued with a copy of the test booklet and a pencil each. The researcher and the pupils entered the biographical information on the cover page of the test booklet together. The children were then required to draw three pictures: a Man, Woman and the Self in that order (Detailed instructions are in Appendix D). The pictures were then hand-scored and the data coded (see Appendix G) for computer analysis.

To ensure objectivity in scoring, one subtest per test booklet was scored at a time for the whole class in one school before scoring the next subtest.
In addition, the bodily parts to be scored were divided into five parts and each part was scored first for each pupil before moving on to the next part. This was done for each test booklet. The scoring was done school by school.

Data Analysis

The statistical techniques used for the analysis of data were the means, correlation analysis and one-way analysis of variance. The Statistical Package for Social Sciences (SPSS Nie, et al., 1975) was used.

Descriptive statistics, for example the mean, median and mode, standard deviation, the variance, the skewness and the kurtosis were computed for each continuous variable. This analysis aimed at exploring the data in order to establish whether there were outliers among the scores or the means, and to determine the variability of the scores across the subjects.

Secondly, the analysis explored the possible relationships between the independent variables (Age, Sex, Effect of School and Teachers' Rating) and the dependent variables (DAP test scores). An F test was used to establish whether there were significant differences between the various levels of each of the independent variables. Post-hoc procedures after ANOVA
were performed to determine where exactly the differences in the independent variables would be found.

The results of the data analysis were interpreted in terms of the hypothesis in Chapter II. The null form of these are restated below:

1. There is no significant relationship between the DAP test scores and the Age of the pupil.

2. There is no significant relationship between the DAP test scores and the Sex of the pupil.

3. There is no significant relationship between the DAP test scores and the Teachers' Rating of the pupil.

4. There is no significant relationship between the DAP test scores and the Effect that school has on the pupil.

In summary, this chapter has stipulated the procedure taken in carrying out the study. The sample, which consisted of 360 pupils from standard I, II and III and whose average age was eight years, was restricted to the 'A' and 'C' schools of the Nairobi City Council. The children drew three pictures which were handscored and three total scores obtained. The scores were further analysed using various statistical techniques by use of a computer. The next chapter shall present the results obtained and a discussion of the results.
CHAPTER IV

RESULTS AND DISCUSSION

This chapter presents the results and discussion of the findings from the analysis. The first part presents the results of the descriptive analysis whereas the second part presents the results of the analysis specifically related to the testing of the hypotheses. The last section shall give a summary of the findings.

Descriptive Statistics For The DAP Test Scores

The maximum possible score awarded on the DAP(M) test was 73 points, on the DAP(W) test was 71 points whereas on the DAP(S) test, a boy could obtain a maximum of 73 points and a girl 71 points. In this study, the highest score obtained on the DAP(M) test was 47 points and the lowest 5; on the DAP(W) the highest was 64 and the lowest 8 and on the DAP(S) the highest score was 57 points and the lowest 7. The mean scores on the three scales were: DAP(M) 19.6, DAP(W) 22.5 and DAP(S) 21.0. Table 4.1 further illustrates the descriptive analysis results obtained.
TABLE 4.1

DESCRIPTIVE STATISTICS FOR THE DAP TEST SCORES

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean</th>
<th>Mode</th>
<th>Median</th>
<th>Variance</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAP(M)</td>
<td>19.6</td>
<td>17.0</td>
<td>18.8</td>
<td>32.0</td>
<td>0.9</td>
<td>2.1</td>
</tr>
<tr>
<td>DAP(W)</td>
<td>22.5</td>
<td>20.0</td>
<td>21.7</td>
<td>42.8</td>
<td>1.3</td>
<td>4.6</td>
</tr>
<tr>
<td>DAP(S)</td>
<td>21.0</td>
<td>19.0</td>
<td>20.4</td>
<td>39.8</td>
<td>0.9</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Table 4.1 indicates that the scores obtained on the DAP tests were low and the variability in performance on the test was high. This can also be observed from the range of marks on each of the three scales for the DAP test. The DAP test scores appear to be positively skewed.

Table 4.2 helps to describe the score distribution of the three scales per school.
### TABLE 4.2

MEANS AND STANDARD DEVIATIONS
OF THE DAP TEST SCORES OF THE
PUPILS FROM THE DIFFERENT SCHOOLS

<table>
<thead>
<tr>
<th>Test</th>
<th>'A' Primary Schools</th>
<th>'C' Primary Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>School 1</td>
<td>School 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAP(M)</td>
<td>17.61</td>
<td>19.64</td>
</tr>
<tr>
<td>DAP(W)</td>
<td>18.91</td>
<td>22.64</td>
</tr>
<tr>
<td>DAP(S)</td>
<td>17.93</td>
<td>20.84</td>
</tr>
</tbody>
</table>

var. = variance

Table 4.2 shows a very interesting pattern of score distribution. The lowest means on all the three scales of the DAP test were observed for school 1 and the highest means for school 4. However, school 4 had greater variance in score distribution on the DAP(M) and DAP(S) as compared to the variances in the other three schools. Greater mean scores were always observed on the DAP(W) scores whereas the variance in score distribution on this scale (W) tended to vary from very high (var. 58.9) to very low (var. 19.5). The variance in the distribution of scores for DAP(W) in school 2 (58.9) and for DAP(S) in school 4 (51.9) were very high and this was related to the high overall
mean scores on these scales in these schools (22.6 and 22.9 respectively) in comparison to the other mean scores.

Already a pattern begins to form indicating a very strong school related effect on the DAP test scores. The highest mean scores on each of the three scales were always observed on the scores of 'C' primary schools and the lowest on the 'A' primary schools.

Table 4.3 helps to compare how the variables in this study are related by observing the correlation coefficients.
### TABLE 4.3

**CORRELATIONS COEFFICIENTS ON ALL THE VARIABLES FOR ALL THE PUPILS. N = 360**

<table>
<thead>
<tr>
<th></th>
<th>AGE</th>
<th>SEX</th>
<th>SCHOOL</th>
<th>T. RATING</th>
<th>DAP(M)</th>
<th>DAP(W)</th>
<th>DAP(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>-0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.30*</td>
<td>0.21*</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>SEX</td>
<td>-0.02</td>
<td>0.16*</td>
<td>-0.09</td>
<td>0.11</td>
<td>0.31*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCHOOL</td>
<td>0.02</td>
<td>0.01</td>
<td>0.33*</td>
<td>-0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEACHER RATING</td>
<td>0.30*</td>
<td>0.33*</td>
<td>0.30*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAP(M)</td>
<td>0.62*</td>
<td>0.63*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAP(W)</td>
<td>0.63*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAP(S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Similarly, the correlation coefficients between the DAP test scores and the mental ability measured by the DAP test increase as the age increases. It is important to observe the maturational aspect of intellectual maturity which can be an important factor to the teacher in the classroom with children.

The correlation coefficients of the teacher's rating against the DAP test scores were also significant at the p < 0.05 level for all the cases. Thus the way in which the teacher rates the pupil appears well with the scores obtained on the DAP test.

* p ≤ 0.05
It can be observed from Table 4.3 that the correlation coefficients between the DAP (M), DAP(W), and DAP(S) tests were significant at the $p \leq 0.05$ level. It can hence be deduced that the three scales of the DAP test would be measuring the same attribute (intellectual maturity). These correlation coefficients were also quite high: DAP(M) with DAP(W), a correlation coefficient of 0.62, DAP(M) with DAP(S) 0.63 and DAP(W) with DAP(S) 0.63.

Similarly, the correlation coefficients between Age and the DAP test scores were significant at the $p \leq 0.05$ level for all the scales. This is an indication that the mental ability being measured by the DAP test increases as the Age increases. Hence we begin to observe the maturational aspect of intellectual maturity which can be an important guiding factor to the teacher in the classroom who may have a problem in knowing the mental level of her/his children.

The correlation coefficients of the Teachers' Rating against the DAP test scores were also significant at the $p \leq 0.05$ level for all the three scales. These correlation coefficients were also very similar for all the scales: DAP(M) 0.30, DAP(W) 0.33 and DAP(S) 0.30. Thus the way in which the teachers rated the pupils agreed well with the scores that the pupils attained on the DAP test.
However, the correlation coefficients between the sex of the pupils and the DAP(M) and DAP(W) scores were not significant indicating that the sex of the child would not have an influence on those test scores. The fact that the correlation coefficients between sex and the DAP(S) test was significant would indicate that the sex of the child played a role in the pupils' performance on this scale.

The correlation coefficients of the Effect of school that a pupil attends and the DAP test scores were not significant for the DAP(M) and DAP(S) tests but were significant for the DAP(W) test. This implies that school had an effect on the way the pupils drew a Woman.

AN INVESTIGATION OF THE DIFFERENCES IN PERFORMANCE ON THE DAP TESTS

Statistical analysis was carried out to determine the relationship between the DAP tests and the independent variables (Age, Sex, School Effect and Teachers' Rating).

Age And DAP Test Scores

This study investigated whether Age had any significant relationship with the DAP test scores. Table 4.4 shows the mean values obtained on the DAP test scores by the different Age groups of children.
### Table 4.4
Mean Values of the Three DAP Sub-Tests for the Different Age Groups

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>TEST</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAP(M)</td>
<td></td>
<td>17.7</td>
<td>18.4</td>
<td>19.1</td>
<td>22.5</td>
<td>17.1</td>
<td>30.0</td>
</tr>
<tr>
<td>DAP(W)</td>
<td></td>
<td>20.4</td>
<td>21.2</td>
<td>22.5</td>
<td>25.1</td>
<td>19.4</td>
<td>26.0</td>
</tr>
<tr>
<td>DAP(S)</td>
<td></td>
<td>19.6</td>
<td>19.6</td>
<td>21.2</td>
<td>23.2</td>
<td>19.1</td>
<td>28.0</td>
</tr>
</tbody>
</table>

Table 4.4 shows that there were differences in the means between the various age groups. The analysis of variance technique was used to test whether these differences were significant. Tables 4.5 to 4.7 therefore present the ANOVA summary tables for the three scales: DAP(M), DAP(W) and DAP(S) respectively.
### TABLE 4.5

**SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF AGE AND DAP(M) TEST SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (age groups)</td>
<td>1276.4</td>
<td>255.3</td>
<td>5</td>
<td>8.63*</td>
</tr>
<tr>
<td>Within (age groups)</td>
<td>10196.2</td>
<td>28.8</td>
<td>354</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11472.6</td>
<td>359</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ 0.05

### TABLE 4.6

**SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF AGE AND DAP(W) TEST SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (age groups)</td>
<td>1083.4</td>
<td>216.7</td>
<td>5</td>
<td>5.4*</td>
</tr>
<tr>
<td>Within (age groups)</td>
<td>14286.0</td>
<td>40.4</td>
<td>354</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15369.4</td>
<td>359</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p ≤ 0.05
TABLE 4.7

SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF AGE AND DAP(S) TEST

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (age groups)</td>
<td>833.5</td>
<td>170.7</td>
<td>5</td>
<td>4.5*</td>
</tr>
<tr>
<td>Within (age groups)</td>
<td>13419.5</td>
<td>37.9</td>
<td>354</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14253.0</td>
<td></td>
<td>359</td>
<td></td>
</tr>
</tbody>
</table>

* $p \leq 0.05$

The results of the one-way ANOVA on the effect of Age on the DAP test scores indicate that the scores of the pupils differed significantly at the $p \leq 0.05$ level on all the three scales. This also supports the fact that Age was significantly correlated ($p \leq 0.05$) with the DAP test scores (Table 4.3). The findings led to the rejection of the null hypothesis that there is no significant relationship between the Age of the child and the DAP test scores. Hence the Age of the child does
determine her/his level of performance on the DAP tests and the older the child, the better the scores as has been established from the results.

Since the ANOVA table results indicated significant differences in the performance of the various Age groups, post-hoc procedures had to be carried out to determine where the significant differences lay among the six Age groups. The results are presented in Table 4.8.
TABLE 4.8

SIGNIFICANT DIFFERENCES AMONG THE SIX AGE GROUPS

This may suggest that the performance of the age groups is not as yet fully differentiated.

<table>
<thead>
<tr>
<th>AGE</th>
<th>DAP TEST</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>M</td>
<td>0.7ns</td>
<td>1.4*</td>
<td>5.8*</td>
<td>0.6ns</td>
<td>12.3*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>0.8ns</td>
<td>2.1*</td>
<td>4.7*</td>
<td>1.0ns</td>
<td>5.6*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>0ns</td>
<td>1.6*</td>
<td>3.6*</td>
<td>0.5ns</td>
<td>8.4*</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>0.7ns</td>
<td>4.1*</td>
<td>1.3*</td>
<td>11.6*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>1.3*</td>
<td>3.9*</td>
<td>1.8*</td>
<td>4.8*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>1.6*</td>
<td>3.6*</td>
<td>0.5ns</td>
<td>8.4*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>3.4*</td>
<td>2.0*</td>
<td>10.9*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>2.6*</td>
<td>3.1*</td>
<td>3.5*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>2.0*</td>
<td>12.1*</td>
<td>6.8*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>M</td>
<td>3.4*</td>
<td>7.5*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>5.7*</td>
<td>0.9*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>4.8*</td>
<td>4.1*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.9*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.6*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.9*</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ 0.05
The Newman-Keuls procedure was used to determine these significances and the full details of the procedure are found in Appendix J.

The results on Table 4.8 indicate there were no significant differences registered for the six and seven year olds on all the three scales of the DAP test. This may suggest that the performance of the two Age groups is not as yet very different. Similarly, there were no significant differences between the six and ten year olds on all the scales. This may suggest that the ten year olds were performing at the level of the six year olds. The ten year olds in this study were termed as "slow learners" by their teachers. There were two in standard I, four in standard II and three in standard III.

However, because all the other means were found to have significant differences between them, it meant that the scores on the DAP test improved as Age increased. Thus the DAP test is able to discriminate mental ability in children.

Sex And DAP Test Scores

The analysis of variance technique was used to test for the effect of Sex on the DAP test scores. The results are presented in Table 4.9 to 4.11.
<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (Sex groups)</td>
<td>99.7</td>
<td>99.7</td>
<td>1</td>
<td>3.13ns</td>
</tr>
<tr>
<td>Within (Sex groups)</td>
<td>11372.9</td>
<td>31.8</td>
<td>358</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11472.6</td>
<td></td>
<td>359</td>
<td></td>
</tr>
</tbody>
</table>

ns - not significant
### TABLE 4.10

**SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF SEX AND DAP(W) TEST SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (sex groups)</td>
<td>170.3</td>
<td>170.3</td>
<td>1</td>
<td>4.01*</td>
</tr>
<tr>
<td>Within (sex groups)</td>
<td>15199.1</td>
<td>42.5</td>
<td>358</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15369.4</td>
<td></td>
<td>359</td>
<td></td>
</tr>
</tbody>
</table>

* $p \leq 0.05$

### TABLE 4.11

**SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF SEX AND DAP(S) TEST SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (sex groups)</td>
<td>1406.5</td>
<td>1406.5</td>
<td>1</td>
<td>39.1*</td>
</tr>
<tr>
<td>Within (sex groups)</td>
<td>12866.4</td>
<td>35.9</td>
<td>358</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14272.9</td>
<td></td>
<td>359</td>
<td></td>
</tr>
</tbody>
</table>

* $p \leq 0.05$
The results of Tables 4.9 to 4.11 indicate significant differences on the DAP(W) and DAP(S) tests but not on the DAP(M) test. The finding that no significant differences existed between the male and female pupils on the DAP(M) test seems to suggest that the sex of the pupil did not influence the drawing of a Man. This finding is also in line with an earlier one that sex and DAP(M) test scores had a very low correlation coefficient (Table 4.3). Thus the null hypothesis that there is no significant relationship between the sex of the pupil and the DAP test scores would be rejected for the DAP(W) and DAP(S) tests and accepted for the DAP(M) test.

Effect of School And DAP Test Scores

The subjects for this study were either from the 'A' or 'C' primary schools and these schools were bound to have an effect on performance on the DAP tests. Table 4.12 presents the mean values obtained on the three subtests by pupils from the four schools.
TABLE 4.12

MEAN VALUES OF THE THREE DAP SUB-TESTS
FOR THE DIFFERENT SCHOOLS

<table>
<thead>
<tr>
<th>TEST</th>
<th>'A' Primary Schools</th>
<th>'C' Primary Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>School 1</td>
<td>School 2</td>
</tr>
<tr>
<td>DAP(M)</td>
<td>17.61</td>
<td>19.64</td>
</tr>
<tr>
<td>DAP(W)</td>
<td>18.86</td>
<td>22.64</td>
</tr>
<tr>
<td>DAP(S)</td>
<td>17.93</td>
<td>20.84</td>
</tr>
</tbody>
</table>

Table 4.12 shows that the mean values varied for the different schools. To establish the relationship between school effect and the performance on the DAP tests, the mean scores of the pupils from the four schools were compared using the one-way analysis of variance (ANOVA) technique. Tables 4.13 to 4.15 present the results.
TABLE 4.13

SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF SCHOOL EFFECT AND DAP(M) TEST SCORES

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (Schools)</td>
<td>589.8</td>
<td>196.6</td>
<td>3</td>
<td>6.43*</td>
</tr>
<tr>
<td>Within (Schools)</td>
<td>10882.8</td>
<td>30.6</td>
<td>356</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11472.6</td>
<td></td>
<td>359</td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ 0.05

TABLE 4.14

SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF SCHOOL EFFECT AND DAP(W) TEST SCORES

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (Schools)</td>
<td>1848.5</td>
<td>616.2</td>
<td>3</td>
<td>16.2*</td>
</tr>
<tr>
<td>Within (Schools)</td>
<td>13520.9</td>
<td>37.9</td>
<td>356</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15369.4</td>
<td></td>
<td>359</td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ 0.05
### TABLE 4.15

**SUMMARY OF THE ONE-WAY ANALYSIS (ANOVA) OF SCHOOL EFFECT AND DAP(S) TEST SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>MS</th>
<th>d.f.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between (Schools)</td>
<td>1337.1</td>
<td>445.7</td>
<td>3</td>
<td>12.3*</td>
</tr>
<tr>
<td>Within (Schools)</td>
<td>12935.9</td>
<td>-36.3</td>
<td>356</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14273.0</td>
<td></td>
<td>359</td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ 0.05

The results of the one-way analysis (ANOVA) show that the scores of the pupils differed significantly on all the three scales: DAP(M), DAP(W) and DAP(S) at *p ≤ 0.05* level. The differences were in favour of the pupils attending the 'C' type schools as the pupils from these schools consistently scored higher marks on the DAP test (Table 4.3) than those from the 'A' type schools. This led to the rejection of the null hypothesis which stated that there was no significant relationship between the DAP test scores and the Effect of School on the pupil.
Further, post hoc procedures after ANOVA were carried out to determine where the differences were among the four schools. The results are presented in Table 4.16.

**TABLE 4.16**

SIGNIFICANT DIFFERENCES AMONG THE FOUR SCHOOLS

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>SUBTEST</th>
<th>Nairobi</th>
<th>Madaraka</th>
<th>Dr. Krapf</th>
<th>St. Georges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>M</td>
<td>0.7ns</td>
<td>2.7*</td>
<td>0.7ns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>0.6ns</td>
<td>4.4*</td>
<td>1.9*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>1.5*</td>
<td>4.4*</td>
<td>0.6ns</td>
<td></td>
</tr>
<tr>
<td>Madaraka</td>
<td>M</td>
<td></td>
<td>2.0*</td>
<td>1.4*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td>3.8*</td>
<td>2.5*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td>2.9*</td>
<td>2.1*</td>
<td></td>
</tr>
<tr>
<td>Dr. Krapf</td>
<td>M</td>
<td></td>
<td></td>
<td>3.4*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td></td>
<td>6.3*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td>5.0*</td>
<td></td>
</tr>
<tr>
<td>St. Georges</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* ~ p <= 0.05
The results on Table 4.16 indicate that the differences in the means were not significant for Nairobi and Madaraka and Nairobi and St. Georges on the DAP(M) scale, Nairobi and Madaraka on the DAP(W) scale, and Nairobi and St. Georges on the DAP(S) scale. It is interesting that Nairobi Primary, a 'C' type school and Madaraka primary an 'A' type school did not have significant differences between their means on the M and W scales. Even though School has an effect on the DAP test scores, this effect may vary from school to school.

| Teachers' Rating And DAP Test Scores |

The final investigation carried out in this study was the relationship between the Teachers' Rating of the pupil and the DAP test scores obtained. Table 4.17 presents the mean values of the three DAP tests against the Teachers' Rating.
Table 4.17 shows that the pupils who had been rated as being in the 'Poor' category by their teachers had the lowest mean scores on all the three scales whereas those that had been rated as being 'Excellent' had the highest mean scores.

Post-hoc procedures after ANOVA were further carried out to determine where the differences were to be found among the four points. The results are presented in Table 4.18.
<table>
<thead>
<tr>
<th>Rating</th>
<th>Subtest</th>
<th>Poor</th>
<th>Fair</th>
<th>Average</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>M</td>
<td>2.1*</td>
<td>3.4*</td>
<td>4.5*</td>
<td>7.4*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>2.7*</td>
<td>4.9*</td>
<td>6.6*</td>
<td>10.7*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>2.5*</td>
<td>4.4*</td>
<td>5.9*</td>
<td>8.1*</td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>M</td>
<td>1.4*</td>
<td>2.4*</td>
<td>5.4*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>1.2*</td>
<td>2.9*</td>
<td>7.1*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>1.9*</td>
<td>3.4*</td>
<td>5.7*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>M</td>
<td></td>
<td>1.1*</td>
<td>4.1*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td>1.7*</td>
<td>5.8*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td>1.5*</td>
<td>3.8*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>M</td>
<td></td>
<td></td>
<td>2.9*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td></td>
<td>4.1*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td>2.3*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+
|                 | M               | W               | S               | M               | W               | S               |
|                 | 2.9*            | 4.1*            | 2.3*            | p ≤ 0.05        |

**TABLE 4.18**

Significance in the Differences Among the Five Points of the Teacher's Rating

The results of Table 4.17 indicate that the five points in the classroom 
with the way in which the children performed

Some of the significant relations between the test scores and the Teacher's rating were reported.

Subsequently in identifying remedial five

Summary of Findings

P values demonstrate the performance of the

Significant differences were found between the

Value is assumed for the verbal test.

The teacher with a positive attitude has an effect on the

p ≤ 0.05
The results of Table 4.18 indicate that all the differences in the means were significant. Thus the way in which the teachers rated the pupils totally agreed with the way in which the pupils performed on the DAP test. Hence this may suggest that the DAP test could be used to complement the teachers' assessments in the classroom.

On the basis of the findings, the null hypothesis that no significant relationship existed between the DAP test scores and the Teachers' Rating was rejected. The DAP test scores can therefore help the teacher tremendously in identifying her/his subjective marks in the classroom.

Summary of Findings

1. Age does determine the performance of the pupil on the DAP test.

2. Significant differences were found between the sex of the child and the DAP(W) and DAP(S) test scores but not for the DAP(M) test.

3. The school that a pupil goes to has an effect on the performance on the DAP test.

4. The Teacher's Rating highly agreed with the scores that the pupils obtained on the DAP tests.
Based on these findings, the next chapter shall present an interpretation of the results, recommendations and directions for future research.
CHAPTER V

INTERPRETATION, IMPLICATIONS AND RECOMMENDATIONS OF THE STUDY

This chapter shall give an interpretation of the results presented in the previous chapter and investigate the implications of the results. Recommendations shall then be made on the basis of this.

Interpretation And Implications Of The Results

The main focus of this study was the investigation of whether the DAP test could be used to measure mental ability of children in the lower primary classes in order that the teacher may use the measure to be able to offer more effective instruction. In doing this, the Age, Sex, Teachers' Rating and the Effect of School that the child attends were deemed important independent variables.

The results of the ANOVA analysis relating to the performance on the DAP tests by the Age of the child indicate that the mean scores obtained improved with increasing Age on the DAP(M), DAP(W) and DAP(S) subtests. This was in line with the findings of other scholars (Goodenough 1926, Harris 1963).
who had noticed that the scores obtained on the DAP tests improved as the Age increased. Court (1980) too observed that the drawing level of children was highly dependent on the Age of the child. These findings imply that the mental ability being measured by the DAP tests increases as Age increases and this is evidence of the maturational aspect of intellectual maturity. The DAP test is thus able to discriminate mental ability in children between six and ten years. This information can be of tremendous help to the teacher in the classroom who needs basic knowledge of the mental level of the children she/he is teaching.

This further establishes the fact that drawing is developmental in nature (Burt 1921, Harris 1963, Court 1980) and these developmental stages can be utilized in the classroom to act as guidelines for the teacher. For example Burt (1921) found that at five to six years, the British children's drawings of a Man was a crude scheme with little attention given to shape and proportion. However at seven to nine years, the scheme became more true to detail. Similar stages were apparent in the drawings of children in this study. For example, most of the six, seven and some of the eight year olds had "stick men" drawings (see Figures 5.1 and 5.2) and this tended to fade out by eight, nine and ten years.
FIGURE 5.1

DRAWING OF A WOMAN BY A 6 YEAR OLD GIRL
The other very noticeable feature was the positioning of the legs on the drawings. Most of the six, seven and even some eight year olds drew the feet wide apart and in most cases, the feet were drawn as being continuous with the edges of the clothing. Figures 5.3 and 5.4 illustrate this.
FIGURE 5.3

DRAWING OF A WOMAN BY A 7 YEAR OLD GIRL

FIGURE 5.4

DRAWING OF A MAN BY A 6 YEAR OLD BOY
However, by eight and nine years, the feet were much closer in the drawings and became more realistic. In fact most of the nine year olds attempted foreshortening of the feet in their drawings. Pencil control improved tremendously with Age.

Further post-hoc procedures after ANOVA indicated that apart from the six and seven year olds on the DAP(S) test, significance in the differences was established between all the Age groups on the DAP(M), DAP(W) and DAP(S) tests. This further suggests that the DAP tests are able to discriminate intellectual maturity between the Age groups.

This study did not however investigate the effect of educational level on the performance on the DAP tests. In this study, the Age of the child was the important independent variable and this did not take into account the class level (standard) of the pupil. This may be important in classrooms composed of pupils of different Ages.

In determining the relationship between the Sex of the child and the DAP tests, the ANOVA results showed significant differences on the DAP(W) and DAP(S) tests at the $p \leq 0.05$ level but not so on the DAP(M) subtest, thus implying that both boys and girls had an equal chance of scoring high marks on this subtest. However, the girls' performance on the DAP(W) (mean 23.2) was better than that of
the boys (mean 21.8). Similarly, the girls' performance on the DAP(S) (mean 23.1) was better than that of the boys (mean 19.1). Since the girls included more items in their drawings, it may be suggested that they have greater intellectual maturity than the boys. This may also be tied up with the fact that generally girls tend to mature (mentally and physically) earlier than the boys.

The items included in the drawings too tended to vary for the different sexes. For example the boys had a tendency to exaggerate the size of the hands and feet whereas the girls tended to minimize these parts as the drawings in Figures 5.3 and 5.5 illustrate.

FIGURE 5.5

DRAWINGS OF A MAN(A) AND A WOMAN(B)
BY A 6 YEAR OLD GIRL

A

B
In addition, the girls had a tendency to exaggerate the size of the head as Figure 5.5 clearly show this. Many boys especially the eight, nine and ten year olds drew the Man and Self in profile positions and in most cases action was portrayed as Figure 5.6 illustrates.

FIGURE 5.6

DRAWING OF THE SELF BY NINE YEAR OLD BOY
The same drawing (Figure 5.6) also shows the tendency for most boys and especially in the eight, nine and ten year age groups to show the biceps on the arms and legs in an attempt to portray a muscular man.

The drawings by the boys tended to be larger than those drawn by the girls. However, the girls had a more distinct trunk as compared to the boys and they also tended to have more fancy dresses and hairstyles with more accessories like handbags and bangles. Generally, the drawings by the girls portrayed a better sense of proportion in the seven and eight year olds.

The significant differences registered in the performances on the DAP(W) and DAP(S) tests by the different sexes may be attributed to the differences in the upbringing of boys and girls in our society. The perceptual levels of the boys and girls are bound to differ if for example girls are always given dolls for toys and boys have mechanical toys like cars. The girls may therefore excel in certain areas in drawing the human figure than the boys and vice-versa. This may be the reason as to why the girls were more concerned with details like the shape of the figure, the eyebrows, the lips and the like which the boys did not pay much attention to and the boys on the other hand were more concerned with drawing the figure in action.
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Performance by the different sexes is of importance to the teacher as most of the primary schools in Kenya are co-educational. But perhaps the teacher may want to discern the differences in abilities separately for the boys and girls as opposed to lumping them together.

This study also considered the Effect of School on the DAP test scores and carried out tests to this end. The type of school that a pupil attends would be an indication of the family's level of income and to a certain extent the socio-economic status of the family since the poorer families would not be able to afford the fees charged in the better quality schools.

The ANOVA results indicated significant differences in the mean scores of the pupils attending the four schools included in this study. Post hoc procedures results further indicated that these differences were not significant for Nairobi and Madaraka and Nairobi and St. Georges on the DAP(M) test, Nairobi and Madaraka on the DAP(W) test and Nairobi and St. Georges on the DAP(S) test. Since the performance by Madaraka, an 'A' type school and Nairobi, a 'C' type school on the DAP(M) test did not differ and a similar result was registered for Nairobi and Madaraka on the DAP(W) it may be suggested that school may not always have an effect on performance on the Man and Woman scales.
The drawings had certain items that tend to be peculiar to certain schools. For example the girls from Nairobi and St. Georges primary schools included items like gloves, hair ribbons, sunglasses and high heeled shoes in their drawings of a Woman which were not very noticeable in the drawings of the girls from Madaraka and Dr. Krapf primary schools. The girls from Nairobi and St. Georges are more exposed to these items and therefore their concept formation appears to be more developed. These differences in the attire drawn tend to show some evidence of socio-economic background as the children will draw what they identify with as that is what they know.

Generally most of the children from all the four schools included in this study had features like the head, eyes, mouth, nose, hair (however crude) in their drawings. The neck, ears and the partitioning of fingers were more often left out especially in the six and seven year old age groups. The trunk in these age groups was drawn using various methods: either a straight line or a rectangular box or a round shape. Figures 5.1 to 5.4 are examples of the different kinds of trunks drawn.

Thus School has an Effect on the DAP test scores obtained. This finding does not, however, in any way make non-valid the use of the DAP tests as a measure of intellectual maturity. The findings of this study cannot also be interpreted to mean that the pupils from the 'C' type schools have greater intellectual
maturity than those from the 'A' type schools. However, given improved facilities, the pupils from the 'A' schools would perhaps obtain a DAP test score that would be the same as or almost the same as that obtained by children of comparable age from the 'C' schools. So even though the children that were sampled for this study could have originally had innate similarity in their abilities, the environment through which they operate was bound to have an influence on their performances. Perhaps the DAP tests could have a different role here: that of providing a measure of mental ability for children joining the school system.

The other area considered in this study was the relationship between the Teachers' Rating and the DAP test scores. The Teachers' Rating was obtained on a five point scale. This rating is a global score that would be an indication of the child's general aptitude level.

The results of this study showed that the way in which the teachers rated the pupils highly agreed with the performances of these pupils on the DAP tests. Thus the pupils that were rated as being excellent were the ones that scored highly on the DAP tests. The pupils' performances on the DAP tests were at the expected levels since the scores obtained were well correlated with the Teachers' Rating. Thus the DAP test scores could give the teacher important additional information that is reliable and since the test is not
teacher made, subjectivity is minimised. As the test is intended for a measure of intellectual maturity, it would help the teacher to know what exactly the mental level of the children in the classroom is and this could be used for better placement of children for more effective teaching.

Summary

The discussion has pointed out the following:

1. The DAP test scores improve with the increasing Age of the child.

2. Since the upbringing of boys and girls varies so much, it is best to have different norms for the boys and girls as Harris (1963) did.

3. Improved school conditions could boost the latent ability of children to the maximum.

4. The DAP tests could be a more objective way of complementing classroom assessments.

Based on these interpretations, a few recommendations shall be made.
Recommendations

1. The DAP tests are highly recommended for the teacher in the lower primary classes as this study has shown that they can effectively complement the teachers' marks.

2. It is recommended that Educational planners re-examine the policies as regards the different types of schools for a more equitable teaching.

Directions For Future Research

A lot more could be done in studying the DAP test as a measure of intellectual maturity which could not be tackled in this study. For example, the measurement differences in mental and chronological age needs further investigation. Similarly, the effect of Educational level on the DAP test scores needs to be looked into further. It may also be of interest to find out why most children performed best on the Woman scale as opposed to the Man scale. The clinical uses of the tests may also need further investigation as the tests seem to give an indirect accurate picture of an individual's experience. There is a need for further investigation of the interaction between the various independent variables studied. This would allow the use of the DAP test for diagnostic purposes of children with learning problems.
Conclusion

This study begun by asking the question "Can the DAP test be used to accurately identify the mental ability of young Kenyan children?" It has presented the case and come to a conclusion that the DAP test can be used to accurately identify the mental abilities of young children in the lower primary classes of Kenya as it is a non-verbal, culture-free, simple and practical test for the teacher. This would be a great step towards achieving our educational goals.
REFERENCES
REFERENCES


Burt, C. Mental and Scholastic Tests. London: King and Son, 1921.


APPENDIX
## Appendix

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APPENDIX A

PLAN FOR DATA COLLECTION

The following was the initial plan for data collection.

1. Pilot Study

A pilot study to be carried out at Kenyatta University Primary School on 25th October, 1986 at 12.00 noon. Forty four pupils from standard I, II and III already selected by the teachers are to be used in the study.

2. Actual Study

Madaraka Estate Primary School, Dr. Krapf Primary School, Nairobi Primary School and St. Georges Primary School are the schools to be used in the study. All pupils from selected streams of standard I, II and III from the above schools will be administered the DAP test.

The above named schools shall be visited between 28th October and 1st November 1986 for the following:

a) Familiarization;
b) consultation on the most suitable dates and times for data collection;

b) to know the number of pupils in the classes to be used in the study.

The period for data collection shall be between 4th and 15th November. On the administration day, the examiner checks that enough copies of the test booklet are available; administers the test and completes the individual record forms and if not completed, to arrange for a return visit to the school. After the test administration, the examiner codes the test booklets and the individual record forms to avoid a mix-up as follows

<table>
<thead>
<tr>
<th>School</th>
<th>Std I</th>
<th>Std II</th>
<th>Std III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>1101</td>
<td>1201</td>
<td>1301</td>
</tr>
<tr>
<td>Madaraka</td>
<td>2101</td>
<td>2201</td>
<td>2301</td>
</tr>
<tr>
<td>Dr. Krapf</td>
<td>3101</td>
<td>3201</td>
<td>3301</td>
</tr>
<tr>
<td>St. Georges</td>
<td>4101</td>
<td>4201</td>
<td>4301</td>
</tr>
</tbody>
</table>

The first column of the counters represents the school (Nairobi - 1, Madaraka - 2, Dr. Krapf - 3 and St. Georges - 4. The second represents the standard (1, 2 or 3) and the last two columns represent the
individual pupils number. Hence '3230' would be the 30th pupil from standard two from Dr. Krapf Primary School. This is for identification purposes.

APPENDIX B

RESULTS OF THE PRELIMINARY STUDY

One of the objectives of conducting a preliminary study was to ascertain whether three drawings from each pupil were necessary. The following results were obtained.

TABLE B.1

PERFORMANCE ON THE DAP TESTS BY AGE AND SEX OF THE PUPIL

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>TEST</th>
<th>DAP(M)</th>
<th>DAP(W)</th>
<th>DAP(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(\bar{x})</td>
<td>sd^2</td>
<td>(\bar{x})</td>
</tr>
<tr>
<td>6</td>
<td>Boys</td>
<td>13.0</td>
<td>1.9</td>
<td>18.5</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>11.0</td>
<td>22.1</td>
<td>26.0</td>
<td>96.0</td>
</tr>
<tr>
<td>7</td>
<td>Boys</td>
<td>13.4</td>
<td>21.2</td>
<td>20.4</td>
<td>28.1</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>13.6</td>
<td>20.1</td>
<td>22.0</td>
<td>47.6</td>
</tr>
<tr>
<td>8</td>
<td>Boys</td>
<td>12.0</td>
<td>12.3</td>
<td>20.0</td>
<td>47.6</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>18.0</td>
<td>3.6</td>
<td>29.7</td>
<td>11.6</td>
</tr>
<tr>
<td>9</td>
<td>Boys</td>
<td>15.1</td>
<td>10.9</td>
<td>23.1</td>
<td>28.1</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>18.0</td>
<td>65.6</td>
<td>27.2</td>
<td>134.2</td>
</tr>
</tbody>
</table>
APPENDIX C

TEST BOOKLET

THE DRAW A PERSON TEST

NAME

BOY GIRL

SCHOOL

DATE OF DRAWING

STANDARD

AGE

BIRTH DATE
MAKE YOUR FIRST DRAWING HERE

DRAW A PICTURE OF A MAN
MAKE YOUR SECOND DRAWING HERE

DRAW A PICTURE OF A WOMAN
MAKE YOUR THIRD DRAWING HERE

DRAW A PICTURE OF YOURSELF
APPENDIX D

DETAILED INSTRUCTIONS FOR THE ADMINISTRATION OF THE DAP TEST

All books and pictures should be put away before giving the test to avoid any copying. All pictures from the walls should also be removed.

All children are provided with a test booklet and a pencil. Erasers and crayons are not allowed to be used during the test.

The children fill in the information required on the cover sheet of the test booklet. It is best to ask them as a group to complete the items one at a time with the examiner directing the task as follows:

"Where it says 'Name', write your names".

"Draw a circle around one of the words 'Boy' or 'Girl' to show whether you are a boy or girl".

"Next write the name of this school".

"Where it says 'Date of Drawing' put today's date. (Could write it on the blackboard)."
"Where it says 'Age' write how old you are now'.

"Where it says 'Birth Date' first write the date you were born, then the month and the year you were born. If you do not know just leave it blank".

4. When the children have finished giving the cover page information, have them fold it back so that the space for the first drawing is exposed. Then give the following instruction:

"I am going to ask you to draw three pictures for me today. We will make them one at a time. On this first page, I want you to make a picture of a Man. Make the very best picture that you can; take your time and work very carefully. Be sure to make the whole Man not just his head and shoulders. Do not draw anything else".

5. When the first drawings have been completed, say a few words of praise and have the children turn over the sheets to the space for the second drawing. Then say:

"This time I want you to make a picture of a Woman. Make the very best picture that you can; take your time and work very carefully."
Be sure to make the whole Woman and not just the head and shoulders. Do not draw anything else).

When this drawing has been completed praise the children to keep up interest. If you think it necessary have the children stretch their arms. Then demonstrate how to fold the sheets so that the two completed drawings are inside and the space for the third drawing is now face up. Now say:

"This last picture is to be someone you know very well so it should be the best picture of all. I want each of you to make a picture of yourself, your whole self, not just your face. Take your time and make this picture the very best of the three. Do not draw anything else".

The examiner strolls around as the children draw and encourages those who are slow and seem to have difficulty by saying: "These drawings are very good, you boys and girls are doing very well".

Do not give suggestions to the pupils and do not make comments or criticisms that will put off the pupils. If children ask for further instructions such as whether the Man is to be doing anything in particular like walking or running, say, "Do it whatever way you think is best".
Avoid saying "Yes" or "No" or giving any further specific instructions to the children.

If a child has spoilt his work and wishes to have a fresh booklet, give him/her a new one but preserve the old one. Note on the margin that it is a second booklet. Write his/her name on the new booklet.
APPENDIX E

PUPIL'S INDIVIDUAL RECORD FORM

NAME

SCHOOL

AGE

DATE OF BIRTH

STANDARD

CLASS TEACHER'S RATING OF THE PUPIL

(Please Tick Appropriately)

EXCELLENT

GOOD

AVERAGE

FAIR

POOR
REQUIREMENTS FOR SCORING THE DRAW - A - MAN SCALE

1. Head present

   Any clear method of representing the head. Features alone, without any outline for the head itself, are not credited for this point.

2. Neck present

   Any clear indication of the neck as distinct from the head and the trunk. Mere juxtaposition of the head and the trunk is not credited.

3. Neck, two dimensions

   Outline of neck continuous with that of the head, of the trunk, or of both. Line of neck must "flow" into head line or trunk line. Neck interposed as pillar between head and trunk does not get credit unless treated definitely to show continuity between neck and head or trunk or both, as by collar, or curving of lines.
4. Eyes present

Either one or two eyes must be shown. Any method is satisfactory. A single indefinite feature, such as is occasionally found in the drawings of very young children, is credited.

5. Eye detail: brow or lashes

Brow, lashes or both shown.

6. Eye detail: pupil

Any clear indication of the pupil or iris as distinct from the outline of the eye. Both must appear if both eyes are shown.

7. Eye detail: proportion

The horizontal dimension of the eye must be greater than the vertical dimension. This requirement must be fulfilled in both eyes if both are shown: one eye is sufficient if only one is shown. Sometimes in profile drawings of a high grade the eye is shown in perspective. In such drawings any triangular form approximating the following examples is credited.

8. Eye detail: glance

Full Face: The eyes obviously glancing. There must be no convergence or divergence of the two pupils, either horizontally or vertically.
Profile: The eyes must either be shown as in the preceding point, or if the ordinary almond form is retained, the pupil must be placed toward the front of the eye rather than in the center. The scoring should be strict.

Nose present

Any clear method of representation. In "mixed profiles," the score is plus even though two noses are shown.

Nose, two dimensions

Full Face: Credit all attempts to portray the nose in two dimensions, when the bridge is longer than the width of the base or tip.

Profile: Credit all crude attempts to show the nose in profile, provided tip or base is shown in some manner. Do not credit simple "button."

Mouth present

Any clear representation.

Lips, two dimensions

Full Face: Two lips clearly shown.
13. Both nose and lips in two dimensions

Bonus point given when Items 10 and 12 are passed.

14. Both chin and forehead shown

Full Face: Both the eyes and mouth must be present, and sufficient space left above the eyes to represent the forehead; below the mouth to represent the chin. The scoring should be rather lenient. Where neck is continuous with face, placement of mouth with respect to narrowing of lower portion of head is important.

15. Projection of chin shown;

chin clearly differentiated from lower lip

Full Face: Modeling of chin must be indicated in some way, as by a curved line below the mouth or lip, or point of chin indicated by appropriate facial modeling, or dot or line placed below mouth near lower limit of face. Beard obscuring chin does not score.

Note: Distinguish carefully from Item 16. There must definitely be an attempt to show a "pointed" chin to credit this item. This point is credited most frequently in profiles.
16. Line of jaw indicated

Full Face: Line of jaw and chin drawn across neck but not squarely across. Neck must be sufficiently wide, and chin must be so shaped that the line of the jaw forms a well-defined acute angle with the line of the neck. Scores strictly on the simple oval face.

17. Bridge of note

Full Face: Nose properly placed and shaped. The base of the nose must appear as well as the indication of a straight bridge. Placement of upper portion of bridge is important; must extend up to or between the eyes. Bridge must be narrower than the base.

18. Hair I

Any indication of hair, however crude.

19. Hair II

Hair shown on more than circumference of head and more than a scribble. Nontransparent, unless it is clear that a bald-headed man is portrayed. A simple hairline across the skull on which no attempt has been made to shade in hair does not score. If any attempt has been made,
even in outline or with a little shading, to portray hair as having substance or texture, the item scores.

20. Hair III

Any clear attempt to show cut or styling by use of side burns, a forelock, or conformity of base line to a "style." When a hat is drawn, credit the point if hair is indicated in front as well as behind the ear, or if hairline at back of neck or across forehead suggests styling.

21. Hair IV

Hair shaded to show part, or to suggest having been combed, or brushed, by means of directed lines. Item 21 is never credited unless Item 20 is; it is thus a "high grade" point.

22. Ears present

Any indication of ears.

23. Ears present: proportion and position

The vertical measurement must be greater than the horizontal measurement. The ears must be placed somewhere within the middle two-thirds of the head.
Full Face: The top of the ear must be separated from the head line, and both ears must extend from the head.

Profile: Some detail, such as a dot, to represent the aural canal must be shown. The shell-like portion of the ear must extend toward the back of the head. (Some children, especially retarded boys, tend to reverse this position, making the ear extend toward the face. In such drawings this item is never credited.)

24. Fingers present

Any suggestion of fingers, separate from hand or arm. In drawings by older children, where there is tendency to "sketch," credit this point if any suggestion of fingers occurs.

25. Correct number of fingers shown

Both hands necessary if both hands are shown. Credit this point in "sketchy" drawings by older children, even though five digits may not be definitely discerned.

26. Detail of fingers correct.

"Grapes" or "sticks" do not score. Length of individual fingers must be distinctly greater than width. In well executed drawings,
where hand may appear in perspective, or where fingers are indicated by "sketching," credit this point. Credit also those cases in which, because the hand is obviously clenched, only the knuckees or part of the fingers appear. This last will occur only in high-quality drawings where there is considerable use of perspective.

Opposition of thumb shown

Fingers must be indicated, with a clear differentiation of the thumb from the fingers. Scoring should be very strict. The point is credited if one of the lateral digits is definitely shorter than any of the others. (compare especially with the little finger), or if the angle between it and the index finger is not less than twice as great as that between any two of the other digits, or if its point of attachment to the hand is distinctly nearer to the wrist than that of the fingers. Conditions must be fulfilled on both hands if both are shown; one hand is sufficient if only one is shown. Fingers must be present or indicated; "mitt" hand does not score, unless figure is definitely in winter garb, wearing mittens.
28. Hands present

Any representation of the hand, apart from the fingers. When fingers are shown, a space must be left between base of fingers and edge of sleeve or cuff. Where no cuff exists, arm must broaden in some way to suggest palm or back of hand as distinct from wrist. Characteristic must appear on both hands if both are shown.

29. Wrist or ankle shown

Either wrist or ankle clearly indicated as separate from sleeve or trouser. A line across the limb to indicate the end of sleeve or trouser, although credited in Item 55, is not sufficient here.

30. Arms present

Any method of representation clearly intended to indicate arms. Fingers alone are not sufficient, but the point is credited if any space is left between the base of the fingers and that part of the body to which they are attached. The number of arms must also be correct, except in profile drawings when only one arm may score.
31. Shoulders I

Full Face: A change in the direction of the outline of the upper part of the trunk which gives an effect of concavity rather than convexity. The point is scored rather strictly. The ordinary elliptical form is never credited, and the score is always minus unless it is evident that there has been a recognition of the abrupt broadening out of the trunk below the neck which is produced by the shoulder blade and the collar bone. A perfectly square or rectangular trunk does not score, but if the corners have been rounded, the point is credited.

Profile: The scoring should be somewhat more lenient than in full-face drawings, since it is more difficult to represent the shoulders adequately in the profile position. A profile drawing, in this connection, should be understood to mean one in which the trunk, as well as the head, is shown in profile. If the lines forming the outline of the upper part of the trunk diverge from each other at the base of the neck in such a way as to show the expansion of the chest, the point is credited.

32. Shoulders II

Full Face: Score more strictly than previous item. Shoulders must be continuous with neck
and arms, and "square," not drooping. If arm is held from the body, the armpit must be shown.

Profile: Shoulder joint in approximately correct position. Arm must be represented by double line.

33. Arms at side or engaged in activity

Full Face: Young children generally draw the arms stiffly out from the body. Credit this point when at least one arm is down at the side, making an angle of no more than 10 degrees with the general vertical axis of the trunk, unless the arms are engaged in some definite activity, such as carrying an object. Credit when hands are in pockets, on hips, or behind back.

Profile: Credit if hands are engaged in definite activity, or if upper arm is suspended even though forearm is extended.

34. Elbow joint shown

There must be an abrupt bend (not a curve) at approximately the middle of the arm. One arm is sufficient. Modeling or creasing of the sleeve is credited.
35. Legs present

Any method of representation clearly intended to indicate the legs. The number must be correct: two in full-face drawings; either one or two in profiles. Use common sense rather than a purely arbitrary scoring. If only one leg is present, but a rough sketch of a crotch is included, showing clearly what the child has in mind, score the item. On the other hand, three or more legs, or a single without logical explanation should be scored minus. A single leg to which two feet are attached is scored plus. Legs may be attached anywhere to the figure.

36. Hip I (crotch)

Crotch indicated. This is most frequently shown by inner lines of the two legs meeting at point of junction with the body. (Young children usually place the legs as far apart from each other as possible, and this never scores.) If one leg shows, buttock must be shaped.

37. Hip II

Preceding item earned with credit to spare. Drawing gives a better idea of the hip than required for passing preceding item.
I. Knee joint shown

There must be, as in the case of the elbow, an abrupt bend (not curve) at about the middle of the leg, or as is sometimes found in very high-quality drawings, a narrowing of the leg at this point. Knee-length trousers are not sufficient. Crease or shading to indicate knee is scored plus.

39. Feet I: any indication

Feet indicated by any means: two feet in full-face; one or two in primitive profile. Young children may indicate feet by attaching toes to the end of the leg. This is credited.

40. Feet II: proportion

The feet and legs must be shown in two dimensions. Feet must not be "clubbed"; that is, the length of the foot must be greater than its height from sole to instep. The length of the foot must be not more than one-third or less than one-tenth the total length of the leg. The item is also credited in full-face drawings in which the foot is shown in perspective, longer than wide, provided the foot is separated in some way from the rest of the leg, and not merely indicated by a line across the leg.
41. Feet III: heel

Any clear method of indicating the heel.
In full-face drawings, credit the item arbitrarily when the foot is shown as below, provided there is some demarcation between the foot and the leg.
In the profile, the instep must be indicated.

42. Feet IV: perspective

Foreshortening attempted in at least one foot.

43. Feet V: detail

Any one item of detail such as lacing, tie, strap, or shoe sole indicated by a double line.

44. Attachment of arms and legs I

Both arms and both legs attached to the trunk at any point, or arms attached to the neck, or at the juncture of the head and the trunk when the neck is omitted. If the trunk is omitted, the score is always zero. If the legs are attached elsewhere than to the trunk, the score is zero. If only one arm or leg is shown, either in full-face or in profile drawings, credit may be given on the basis of the limb that is shown. If both arms and legs are shown, the members of each pair must be attached approximately symmetrically. Arms attached to the legs score zero.
45. Attachment of arms and legs II

Legs attached to trunk, and arms attached to the trunk at the correct point. Do not credit if arm attachment occupies one-half or more of the chest area (neck to waist). When no neck is present, the arms must definitely be attached to the upper part of the trunk.

Full Face: When Item 31 is plus, the point of attachment must be exactly at the shoulders. If Item 31 is zero, the attachment must be exactly at the point which should have been indicated as the shoulders. Score very strictly, especially in those cases where Item 31 is zero.

Profile: Do not credit if both the lines delineating the arm extend from the outline of the back, or if the point of attachment either reaches the base of the neck, or falls below the greatest expansion of the chest line.

46. Trunk present

Any clear indication of the trunk, either one or two dimensions. Where there is no clear differentiation between the head and the trunk, but the features appear in the upper end of a single figure, the point is scored plus if the features do not occupy more than half the length of the figure; otherwise, the score is zero, unless a cross line has been drawn to indicate the termination of the head.
A single figure placed between the head and the legs is always counted as a trunk, even though its size and shape may suggest a neck rather than a trunk. (This ruling is based on the fact that, when questioned, a number of children whose drawings showed this peculiarity, called the part a trunk.) A row of buttons extending down between the legs is scored zero for trunk but plus for clothing, unless a cross line has been drawn to show the termination of the trunk.

47. Trunk in proportion, two dimensions

Length of the trunk must be greater than breath. Measurement should be taken at the points of greatest length and of greatest breath. If the two measurements are equal, or so nearly so that the difference is not readily determined, the score is zero. In most instances the difference will be great enough to be recognized at a glance, without actually measuring.

48. Proportion: head I

Area of the head not more than one-half or less than one-tenth that of the trunk. Score rather leniently. See below for a series of standard forms of which the first is double the area of the second in each pair.
Proportion: head

Head approximately one-fourth trunk area.
Score strictly; over one-third or under about one-fifth fails the item. Where crotch is not shown, as in some profiles, consider belt or waist at about two-thirds down total trunk length.

1. Proportion: face

Full Face: Length of head greater than its width. Should show a general oval shape.

Profile: Head definitely elongated. Face longer than "dome" of skull.

1. Proportion: arms

Arms at least equal to the trunk in length.
Tips of hands extend to middle of hip but not to knee. Hands need not necessarily extend to or below the crotch, especially if legs are unusually short. In full-face drawings, both hands must so extend. Score by relative lengths, not position, of arms.
52. Proportion: arms II

Arms taper; forearm narrower than upper arm. Any tendency to narrow the forearm except right at the wrist, is credited. If both arms show clearly, tapering must occur in both.

53. Proportion: legs

Length of the legs not less than the vertical measurement of the trunk not greater than twice that measurement. Width of either leg less than that of the trunk.

54. Proportion: limbs in two dimensions

Both arms and legs shown in two dimensions. If the arms and legs are in two dimensions, the point is credited, even though the hands and feet are drawn in linear dimension.

55. Clothing I

Any clear representation of clothing. As a rule the earliest forms consist of a row of buttons running down the center of the trunk, or of a hat, or of both. Either alone scores. A single dot or small circle placed in the center of the trunk is practically always intended to represent the navel and should not be credited as clothing.
A series of vertical or horizontal lines drawn across the trunk (and sometimes on the limbs as well) is a fairly common way of indicating clothing, and should be so credited. Marks to indicate pockets or sleeve-ends also get credit.

Clothing II

At least two articles of clothing (as hat and trousers) nontransparent; that is, concealing the part of the body which they are supposed to cover. In scoring this point it must be noted that a hat which is merely in contact with the top of the head but does not cover any part of it is not credited. Buttons alone, without any other indication of the coat, are not credited. Two of the following must be present to indicate coat: sleeves, collar or neckline, buttons, or pockets. Trousers must be clearly intended by belt, fly, pockets, cuff, or any separation of feet or leg from bottom of trouser leg. Foot as an extension of leg does not score, when a line drawn across the leg is the only way of indicating the separation of foot and leg.

Clothing III

Entire drawing free from transparencies of any sort. Both sleeves and trousers must be shown as distinct from wrists or hands and legs or feet.
58. Clothing IV

At least four articles of clothing definitely indicated. The articles should be among those in the following list: hat, shoes, coat, shirt, collar, necktie, belt, trousers, jacket, sport shirt, overalls, socks (pattern). Note: must show some detail, as laces, toe cap, or double line for the sole. Heel alone is not sufficient. Trousers must show some features, such as fly, pockets, cuffs. Coat or shirt must show either collar, sleeves, pockets, lapels, or distinctive shading, as spots or stripes. Buttons alone are not sufficient. Collar should not be confused with neck shown merely as insert. The necktie is often inconspicuous and care must be taken not to overlook it, but it is not likely to be mistaken for anything else.

59. Clothing V

Costume complete without incongruities. This may be a "type" costume (e.g., cowboy, soldier) or costume of everyday dress. If the latter, it should be clearly recognized as appropriate; e.g., sport shirt on man, cap appropriate to hunting outfit, overalls for farmer. This is a "bonus" point, and must show more than necessary for item 58.
0. Profile I

The head, trunk, and feet must be shown in profile without error. The trunk may not be considered as drawn in profile unless the characteristic line of buttons has been moved from the center to the side of the figure, or some other indication, such as the position of the arms, pockets, or necktie shows clearly the effect of this position. The entire drawing may contain one, but not more than one, of the following three errors:

1. One body transparency, such as the outline of the trunk showing through the arm.

2. Legs not in profile. In a true profile at least the upper part of the leg which is in the background must be concealed by the one in the foreground.

3. Arms attached to the outline of the back and extending forward.

61. Profile II

The figure must be shown in true profile, without error or any body transparency.
62. Full Face

(Include partial profile, where attempt is to show figure in perspective.) All major body parts in proper location and correctly joined unless hidden by perspective or clothing.

Essential items: Legs, arms; eyes, nose, mouth, ears; neck, trunk; hands and feet. Parts must be in two dimensions. Feet may be in perspective, but not in profile, unless they turn "out" in opposite directions.

63. Motor coordination: lines

Look at the long lines in arms, legs, and trunk. Lines should be firm, well-controlled and free from accidental wavering. A few long lines may be retraced or erased. The drawing need not achieve very smoothly "flowing" lines to earn credit. Young children sometimes "color in" with their pencils; examine carefully the fundamental lines of their drawings. Older children frequently use a "sketching" technique readily distinguishable from the uncertain, wavering lines resulting from immature coordination. If the general effect is that of firm, sure lines showing that the pencil was under control, credit the item. The drawing may be quite immature and still score on this point.
64. Motor coordination: junctures

Look at the juncture points of lines. They must meet cleanly without a marked tendency to cross or overlap, or leave gaps between the ends. A drawing with few lines is score more strictly than one with frequent changes in direction of line. A "sketchy" drawing is ordinarily credited even though the junctures of lines may seem uncertain, since this is a characteristic confined almost entirely to drawings of a mature type. Some erasures may be allowed.

65. Superior motor coordination

This is a "bonus" point for good pencil work on details as well as on major lines. Look at the small detail as well as at the character of the major lines. All lines should be firmly drawn, with correct joining. Pencil work in fine detail - facial features, small items of clothing, etc. - indicates a good control of the pencil. Scoring should be quite strict. Erasures and/or redrawing invalidate this item.

* Items 63, 64, and 65 concern the quality of the child's control of the pencil. These items evaluate the firmness and sureness of line, quality of line junctions, "corners," etc.
66. Directed lines and form: head outline

Outline of head must be drawn without obviously unintentional irregularities. The point is credited only in drawings where the shape has developed beyond the first crude circle or ellipse. In profile drawings, a simple oval to which a nose has been added does not score. Scoring should be rather strict; the contour of the face must be developed as a unit, not by adding parts.

67. Directed lines and form: trunk outline

Same as for the preceding item, but here with reference to the trunk. Note that the primitive "stick," circle, or ellipse does not score. The body lines must show an attempt to follow an intentional deviation from the simple ovoid form.

68. Directed lines and form: arms and legs

Arms and legs must be drawn without irregularities, as in above item, and without tendency to narrowing at the points of junction with the body. Both arms and legs must be in two dimensions.
Directed lines and form: facial features

Facial features must be symmetrical in all respects. Eyes, nose, and mouth must all be shown in two dimensions.

Full Face: The features must be appropriately placed, regular and symmetrical, giving a clear appearance of the human form.

Profile: The eye must be regular in outline and located in the forward one-third of the head. The nose must form an obtuse angle with the forehead. The scoring should be strict; a "cartoon" nose is not credited.

"Sketching" technique

Lines formed by well-controlled short strokes. Repeated tracing of long line segments is not credited. "Sketching" technique appears in the work of some older children and almost never occurs under age eleven or twelve.

Items 66 - 69 concern the child's deliberate direction of the pencil to produce a good form. The child's work must show that he has exercised control, firmly and surely.
71. "Modeling" technique

"Lines" or shading must indicate one or more of the following: garment creases, wrinkles or folds, other than trouser press; fabric; hair; shoes; "coloring in"; or background features.

72. Arm movement

Figure must express freedom of movement in both shoulders and elbows. One arm suffices. Credit hands on hips or in pockets, if both shoulders and elbows are apparent. A definite activity need not be indicated.

73. Leg movement

Freedom of movement portrayed both in hips and knees of the figure.
REQUIREMENTS FOR SCORING THE DRAW-A-WOMAN SCALE

1. Head present

Any clear method of representing the head. Features alone, without any outline for the head itself, are not credited for this point.

2. Neck present

Any clear indication of the neck as distinct from the head and the trunk. Mere juxtaposition of the head and the trunk is not credited.

3. Neck, two dimensions

Outline of neck continuous with that of the head, of the trunk or of both. Line of neck must "flow" into head line or trunk line. Neck interposed as pillar between head and trunk does not get credit unless treated definitely to show continuity between neck and head or trunk or both, as by collar, or curving of lines.

4. Eye present

Either one or two eyes must be shown. Any method is satisfactory. A single indefinite feature, such as is occasionally found in the drawings of very young children, is credited. Credit also, in mature drawings attempting perspective, any indication of the eye by contour of the profile.
5. Eye detail: brow or lashes

Brow, lashes or both shown.

6. Eye detail: pupil

Pupil shown. Credit any clear indication of the pupil or iris as distinct from the outline of the eye. Both pupils must appear if both eyes are shown.

7. Eye detail: proportion

The horizontal measurement of the eye must be greater than the vertical dimension. This requirement must be fulfilled in both eyes if both are shown; one eye is sufficient if only one is shown.

8. Cheeks

Credit modeling or "shading" on cheeks or at mouth corners. Credit also "cosmetic cheeks" - circular spots on cheeks. In drawings which attempt perspective, credit any indication in contour of face.

9. Nose present

Any clear method of representation. In "mixed profiles," the score is plus even though two noses are shown.
10. Nose, two dimensions

Full Face: Credit all attempts to portray the nose in two dimensions, when the bridge is longer than the width of the base or tip.

Profile: Credit all crude attempts to show the nose in profile, provided tip or base is shown in some manner. Do not credit simple "button."

11. Bridge of nose

Full Face: Nose properly placed and shaped. The base of the nose must appear as well as the indication of a straight bridge. Placement of upper portion of bridge is important; must extend up to or between the eyes. Bridge must be narrower than the base.

12. Nostrils shown

Any attempt to portray nostrils as holes, dots, or to show "wings."

13. Mouth present

Any clear representation.

14. Lips, two dimensions

Two lips clearly shown.
15. "Cosmetic lips"

Any clear attempt to show "Cupid's bow." Score based on the outer shape. Two lips need not be shown.

16. Both nose and lips in two dimensions

Bonus point given when both Items 10 and 14 are passed.

17. Both chin and forehead shown

Full Face: Sufficient space must be left above the eyes to represent the forehead, and below the mouth to represent the chin. The scoring should be rather lenient. Where neck is continuous with face, placement of mouth with respect to narrowing of lower portion of head is important.

Profile: The point may be credited when the eyes and mouth are omitted, if the outline of the face shows clearly the limits of the chin and forehead. Score leniently if forehead is covered by hat brim; more strictly if covered by hair.
18. Line of jaw indicated

Full Face: Line of jaw and chin drawn across neck but not squarely across. Neck must be sufficiently wide, and chin must be so shaped that the line of the jaw forms a well defined acute angle with the line of the neck. Score strictly on the simple oval face.

Profile: Line of jaw extends toward (but all the way to) the ear or across the neck.

19. Hair I

Any indication of hair, however crude.

20. Hair II

Scribble closely conforming to head, or

Full Face: Shaped masses suggesting braids or locks each side of face.

21. Hair III

Style suggested by indentation at temple, or bangs, or shaped at lower ends, or both.

General "style" achieved. Distinctly better design than Item 20.
22. Hair IV

Use of directed lines to indicate a part, texture, or combing. Superior style achieved.

Caution: Score strictly; superior style may be achieved with outline sketching, but this does not score. Directed lines to indicate hair texture must appear, and be better than "coloring in."

23. Necklace or earrings

Any clear indication. Distinguish necklace from neckline or collar of dress. Earrings without ears (which may be concealed by hair) should be credited.

24. Arms present

Any method of representation clearly intended to indicat arms. Fingers alone are not sufficient, but the point is credited if any space is left between the base of the fingers and that part of the body to which they are attached. The number of arms must be correct, except in profile drawings when only one arm may score.
25. Full Face: A distinct change in the direction of the upper part of the trunk, which gives the effect of a "rounded corner." The ordinary elliptical form is never credited. There must be an abrupt broadening of the trunk below the neck, which then turns downward into the arms or sides of the trunk. Square corners fail.

Profile: Somewhat more lenient where the trunk as well as the head is shown in profile. If the lines that form the upper part of the trunk diverge from each other at the base of the neck so as to show the expansion of the chest, credit the point.

26. Arms at side (or engaged in activity or behind back)

Full Face: Young children generally draw the arms held stiffly out from the body. Credit this point when at least one arm is down at the side, making an angle of no more than 10 degrees with the general vertical axis of the trunk, unless the arms are engaged in some definite activity, such as carrying an object. Credit when hands are placed on hips or behind the back.

Profile: Credit if hands are engaged in definite activity, or if upper arm is suspended, even though forearm is extended.
27. Elbow joint shown

There must be an abrupt bend (not a curve) at approximately the middle of the arm. One arm is sufficient. Modeling or creasing of the sleeve is credited.

28. Fingers present

Any indication of fingers. Mitt hand does not even score if thumb is shown.

29. Correct number of fingers shown, the correct number on each is necessary, unless there is a clear attempt to portray hand activity which would conceal the correct number. Credit drawings produced by older children who try a "sketching" technique, even though five digits may not be definitely discerned.

30. Detail of fingers correct

"Grapes" or "sticks" do not score. Length of individual fingers must be distinctly greater than width. In well-executed drawings, where hand may appear in perspective, or where fingers are indicated by "sketching," credit this point. Credit also those cases in which, because the hand is obviously clenched, only the knuckles or part of the fingers appear. This last will occur only in high-quality drawings where there is considerable use of perspective.
31. Opposition of thumb shown

A clear differentiation of the thumb from the fingers. Scoring should be very strict. The point is credited if one of the lateral digits is definitely shorter than any of the others (compare especially with little finger), or if the angle between it and the index finger is not less than twice or if its point of attachment to the hand is distinctly nearer to the wrist than that of the fingers. Conditions must be fulfilled on both hands if both are shown, unless hand is grasping something; one hand is sufficient if only one is shown. Five digits are necessary for thumb to score. Fingers must be present or indicated; "mitt" hand does not score unless subject is definitely shown in winter garb, wearing mittens.

32. Hands present

Any representation of the hand, apart from the fingers. When fingers are shown a space must be left between base of fingers and edge of sleeve or cuff. Where no cuff exists, arm must broaden in some way to suggest palm or back of hand as distinct from wrist. Characteristic must appear on both hands, if both are shown. "Mitt" hand with thumb does not score unless figure obviously is wearing mittens.
33. Legs present

Any method of representation clearly intended to indicate the legs. There must be two legs in full-face drawings, and either one or two, in profiles. Credit where long skirt hides legs or feet.

34. Hip

Full Face: The principal axes of the legs must form a distinct angle. The distance between the ankles must be greater than the distance between the inner surface of the legs at the skirt line, and the difference must be more than can be accounted for by contours of the calf and ankle. Do not credit in the case of a long gown.

Profile: Credit when legs form angle, as in walking. Credit in standing figure, when one leg is shown, or when two appear in true profile.

35. Feet I: any indication

Feet indicated by any means: two feet in full-face; one or two in profile. In the case of a long gown, credit this item.
36. Feet II: proportion

Full Face: Feet must be longer than wide, or drawn in perspective.

Profile: Horizontal dimension of fore-part of foot must be greater than vertical dimension. In the case of a long gown, credit only when foot is indicated in some way, as by the tip appearing beneath the edge of the gown, etc.

37. Feet III: detail

Foot or shoe must show some ornamentation, such as a buckle, tie, strap, or sole. In the case of a long gown, do not credit unless foot is shown.

38. Shoe I: "feminine"

Credit any clear attempt to depict a feminine shoe as opposed to "brogan" or other thick, solid shoe. Note especially attempts to depict slender toe or arch, high heel, open toe, or straps. If heel is crucial point, it should be at least one-third of total height of shoe at that point. Shoe must be marked off from leg, either by a line or by profile shaping. In the case of a long gown, credit only when shoe is shown.
39. Shoe II: style

Shoe must be clearly feminine and "styled," i.e., clearly a pump, tie, open toe, wedgie, saddle-shoe, etc. In the case of a long gown, credit only when clearly shown.

40. Placement of feet appropriate to figure

Full Face: Feet turned "in" or "out," or in perspective.

Profile: Credit both feet turned in direction of head. Do not credit when feet are absent, except where long gown hides feet.

41. Attachment of arms and legs I

Both arms and legs attached to the trunk at any point, or arms attached to the neck, or at juncture of head and trunk when neck is omitted. Do not credit if either arms or legs are missing. Credit where dress hides legs and/or feet. If the trunk is omitted, the score is always zero. If the legs are attached elsewhere than to the trunk, regardless of the attachment of the arms, the score is zero. If only one arm or leg is shown, either in full-face or profile drawings, credit may be given on the basis of the limb that is shown. If both arms and legs are shown, the members of each pair must be attached approximately symmetrically.
Credit where long dress hides legs and/or feet. Be careful to distinguish this item from Item 25.

42. Attachment of arms and legs II

Arms attached to the trunk at the correct position. Legs attached to the bottom of the trunk or skirt and not continuous with vertical line or drape of the skirt. Credit this point if both feet and legs are hidden by long gown.

Arms: Full Face: Where Item 25 is failed, attachment must be exactly at the point where the shoulders should have been indicated. Score very strictly, especially when Item 25 is zero. Do not credit if arms at their place of attachment occupy as much as one-half or more of the distance from the neck to the waist. The following sketch illustrates when Item 41 but not Item 42 scores:

\[
\text{Arms: Profile: The attachment of the arms must be indicated at a point approximately on the median line of the trunk, at a short distance below the neck, this point coinciding with the broadening of the trunk which indicates the chest and shoulders. If the arms extend from}
\]
the line which outlines the back, or if the point of attachment reaches the base of the neck, or falls below the greatest expansion of the chest, the point is not credited.

43. Clothing indicated

Clothing indicated by buttons or pockets on the simple ellipse, triangle, or trapezoid figure. Credit if there is definitely a skirt, even if no buttons or pockets are shown.

44. Sleeve I

Indicated by any means.

45. Sleeve II

Indicated by more than a simple cross line. Must show button, cuff, double line, puffed sleeve (long or short), or sleeve definitely wider than the arm which protrudes from it. Where a strap or strapless gown is clearly indicated, credit both Items 44 and 45. When hands are so placed that possible cuff is hidden, do not credit unless short sleeve is clearly indicated. Note: Be careful not to confuse bracelet or wristwatch with sleeve.
46. Neckline I

Any dress line at neck other than that produced by chin or jaw. Any crude single line, straight or semicircular. Distinguish carefully from necklace.

47. Neckline II: collar

Collar indicated. Neckline must be "V'd" or definitely shaped in some other manner.

48. Waist I

Whether or not a belt is shown, the direction of the body contour must change perceptibly at and/or below the waist. If no belt or waist is drawn, a gentle, continuous curve does not score; there must be an abrupt change in body line.

49. Waist II

A distinct belt (two lines), sash, sweater, or blouse hem must be indicated by means better than a single horizontal line.

50. Skirt "modeled" to indicate pleats or draping

Irregular hemline not sufficient; lines, shading, or sketching must appear.
51. No transparencies in the figure

There must be a garment on the figure that is clear and complete. Clothing must show neckline, sleeves, skirt hem, or slacks. No body lines may show through clothes that would ordinarily conceal them.

52. Garb feminine

Young Children (under 8): Skirt must be a distinct feature, and the body must appear in two distinct segments.

Older Children (8 and over): Credit any dress or skirt. Where slacks, breeches, or overalls are shown, credit only if the style of blouse or pants is distinctly feminine, apart from hair, face, or breast indication. Slacks may be judged by absence of fly and by placement of pockets.

53. Garb complete, without incongruities

Garb must contain all these elements: shoes, sleeves (hands must protrude), dress and neckline or sleeves, or skirt and blouse (or jacket). Exceptions: Slacks, blue jeans, sports garb, formal dress which may obscure shoes. These are credited.
54. Garb a definite "type"

Types may include: formal gown, sports garb (shorts, slacks), "school garb," "dress up," house dress (should include apron), or "suit" (jacket and skirt).

55. Trunk present

Any clear indication of the trunk, either one or two dimensional.

56. Trunk in proportion, two dimensions

Length of trunk greater than breadth. In drawings by younger children, where the trunk may not be clearly differentiated from the skirt, judge body area as including skirt.

57. Head-trunk proportion

Young Children (under 8): Score in relation to body area, excluding head when no differentiation between waist and terminus of trunk or no indication of skirt is shown.

Older Children (8 and over): Credit drawings that indicate a garment but do not suggest a waistline, if the head is no larger than one-fourth or smaller than one-eighth of the body (including garment) area.
Profile: Score more leniently. Judge more on the length of head in relation to the length of the chest area. If two lengths are about equal, or if head is the shorter length but not less than one-fourth the chest length, credit the item.

58. Head: proportion

Full Face: Length of head greater than its width. Should show a general oval shape.

Profile: Same requirement as full-face drawing, but exclude hair in estimating width.

59. Limbs: proportion

Length of arms and legs greater than width. When arms score, credit the item even if feet are concealed by long dress.

60. Arms in proportion to trunk

Both arms longer than length of trunk from shoulder (or base of neck) to waist, but not more than twice this length.

Young Children (under 8): Arms must be equal to body length.
Older Children (8 and over): Credit drawings that portray dress or skirt if arm length is at least half of dress length (shoulder to hem of skirt) but not as long as hem.

61. Location of waist

This item evaluates child's ability to locate the waist. Waist located below one-third of total length of figure, crown to toe, but not below one-half of total length. (Crown is considered the top of the head, including hair but not hat.) Waistline must be indicated by belt, or by some distinct change in body contour. Do not credit when trunk and dress are indicated by uninterrupted curve, with no indication of waistline.

62. Dress area

Dress area below waist must be as large or larger than trunk area above waist but not more than twice as large (three times as large in profile). Credit if formal gown is clearly represented. For slacks, include the area occupied by the legs but not the feet. Define as waist a waist line however indicated, or estimate location from an obvious narrowing of body, or widening of hips. Do not credit in drawings by young children showing no trunk or body contours.
63. Motor coordination: junctures

All lines meet cleanly, without overlap or intervening space. Emphasis is on the juncture of lines, regardless of the character of lines.

64. Motor coordination: lines

Lines are firm, cleanly made, continuous and "controlled." If "sketchy" judge the basic character of the body lines created by the shorter pencil strokes. Both curved and straight lines must be handled with assurance. Do not credit in a drawing with extensive redrawing and erasures.

65. Superior motor coordination

Credit this point in all cases where Item 64 is achieved without redrawing or erasures, and where the total effect of lines is neat, clean, and "sure."

66. Directed lines and form: head outline

The drawing must show the contours of the head and/or face. Simple circle or ellipse to which projecting features have been added does not score.
7. Directed lines and form: breast

Any attempt, by modeling or by contour, to indicate the feminine breast. In full-face drawings, credit strapless gown if top is curved.

68. Directed lines and form: hip contour

Full Face: Hips indicated by distinct convexity below waistline. This must occur on both sides. Note that wide, uniformly curved bell-shaped flaring skirt does not score.

Profile: Convexity must be indicated over hips and buttocks.

69. Directed lines and form: arms taper

Wrist and/or forearm distinctly narrower than upper arm. Credit the point whether achieved by narrowing of sleeve or by shaping the bare arm. Where long, full sleeves are clearly indicated, credit this item.

70. Directed lines and form: calf of leg

Leg shaped better than a taper. Definite calf must be shown. Score strictly.
71. Directed lines and form: facial features

Facial features must be symmetrical in all respects. Eyes and mouth must be shown in two dimensions; nose may be indicated by dots.

Full Face: Features must be appropriately placed, regular and symmetrical, giving a clear appearance of the human form.

Profile: The eye must be regular in outline and located in the forward one-third of the head. The bridge of the nose must form an obtuse angle with the forehead. The scoring should be strict; a "cartoon" nose does not get credit.
## CODES FOR COMPUTER ANALYSIS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>1</td>
</tr>
<tr>
<td>Standard</td>
<td>2</td>
</tr>
<tr>
<td>Standard</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Schools</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi</td>
<td>1</td>
</tr>
<tr>
<td>Madaraka</td>
<td>2</td>
</tr>
<tr>
<td>Dr. Krapf</td>
<td>3</td>
</tr>
<tr>
<td>St. Georges</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex of pupil</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Boy</td>
<td>1</td>
</tr>
<tr>
<td>Girl</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age of pupil</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.6 - 6.5 years</td>
<td>6</td>
</tr>
<tr>
<td>6.6 - 7.5 years</td>
<td>7</td>
</tr>
<tr>
<td>7.6 - 8.5 years</td>
<td>8</td>
</tr>
<tr>
<td>8.6 - 9.5 years</td>
<td>9</td>
</tr>
<tr>
<td>9.6 - 10.5 years</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher's Rating</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>5</td>
</tr>
<tr>
<td>Good</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>3</td>
</tr>
<tr>
<td>Fair</td>
<td>2</td>
</tr>
<tr>
<td>Poor</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DAP(M) scale</th>
<th>The actual marks obtained on each test.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAP(W) scale</td>
<td></td>
</tr>
<tr>
<td>DAP(S) scale</td>
<td></td>
</tr>
</tbody>
</table>
OUTLINES ALONG WHICH THE DAP TEST WAS SCORED

a) The presence of all body parts.
   Items like the head, neck, eyes, nose, mouth, lips, chin, forehead, hair, ears, cheeks, fingers, hands, wrist, ankle, arms, shoulders, elbows, legs, hip, knees, feet and trunk were looked for.

b) The details put into the body parts.
   - whether parts like the neck, nose, lips are shown in two dimensions;
   - whether eyes have the pupil, brow or lashes included;
   - whether the chin and forehead are shown;
   - whether the line of jaw is indicated
   - whether the bridge of the nose is shown;
   - whether the hair is shaped;
   - whether the correct number of fingers and the opposition of the thumb are shown;
   - whether the shoulders are continuous with the neck and arms;
   - whether the hip crotch is shown;
   - whether the feet are drawn in perspective and have any details like shoes, laces and the like included.
c) Movement of the figure.
- whether the arms are at the sides or engaged in activity;
- whether there is leg movement as portrayed in the hips, knees;
- whether the figure is in action.

d) Drawing in proportion.
- whether the trunk is in proportion to the rest of the body;
- whether the head, the face and the limbs are in proportion to one another.

e) Motor co-ordination.
- whether the lines of the legs and trunk are firm and controlled;
- whether the junction points of lines meet neatly without a marked tendency to cross or overlap or leave gaps between the ends;
- whether there are directed lines and form as indicated by the head, trunk, limbs and facial features.

f) Modelling and sketching techniques.
- whether these are indicated in the figure.
APPENDIX J

CALCULATION OF THE POST-HOC PROCEDURE AFTER ANOVA

It became necessary to carry out post-hoc procedures as most of the ANOVA table results had indicated significant differences in the variables.

The values reported in the text are the actual differences between the means. To determine whether these were significant, the Neuman-Keuls (N-K) procedure was used. Using the results in Table AJ1 as an example, I shall illustrate the procedure.

TABLE AJ1

SIGNIFICANT DIFFERENCES AMONG THE SIX AGE GROUPS ON THE DAP(M) TEST. N = 360

<table>
<thead>
<tr>
<th>GROUP 1 (10 yrs)</th>
<th>GROUP 2 (6 yrs)</th>
<th>GROUP 3 (7 yrs)</th>
<th>GROUP 4 (8 yrs)</th>
<th>GROUP 5 (9 yrs)</th>
<th>GROUP 6 (12 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M = 17.1</td>
<td>17.7</td>
<td>18.4</td>
<td>19.1</td>
<td>22.5</td>
<td>30</td>
</tr>
</tbody>
</table>

\[
\begin{array}{c|c|c|c|c|c}
  & SS & d.f. & MS & F \\
\hline
\text{Between} & 1276.4 & 5 & 255.3 & 8.63^* \\
\text{Within} & 10196.2 & 354 & 28.8 & \\
\end{array}
\]
Procedure

We need a Matrix table.

\[
\sqrt{\frac{MS_e}{n(1 - \alpha)}} \hat{\eta}(r_1, fe) = 0.78 \quad 0.93 \quad 1.02 \quad 1.10 \quad 1.13
\]

<table>
<thead>
<tr>
<th>(1 - \alpha ) ( q ) ((r_1, fe))</th>
<th>2.77</th>
<th>3.31</th>
<th>3.63</th>
<th>3.86</th>
<th>4.03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differences between Means</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>0.6</td>
<td>1.3*</td>
<td>2.0*</td>
<td>3.4*</td>
<td>12.9*</td>
</tr>
<tr>
<td>2</td>
<td>0.7</td>
<td>1.4*</td>
<td>5.8*</td>
<td>12.3*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.7</td>
<td>4.1*</td>
<td>11.6*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3.4*</td>
<td>10.9*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7.5*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The differences between all pairs of Means, arranged in order of size, are written in matrix form. For example, Mean_2 - Mean_1 = 17.7 - 17.1 = 0.6 and this is entered as the difference between \(M_2\) and \(M_1\).
2. The value of \( q(r_1, fe) \) at the confidence level - 95 percent in this case, is found in the table for the studentized range statistic. \( fe \) is the within or error variance d.f. For each DAP test, the \( fe = 354 \). The value of \( r \) in each case is

\[
\text{Column Number - Row Number + 1.}
\]

For example, the \( r \) of 2.0 is \( 4 - 1 + 1 = 4 \).

3. Since we wish to determine whether

\[
\frac{M_j - M_j^1}{\sqrt{MS_e/n}} = (1 - \alpha)q(r_1, fe)
\]

this is equivalent to asking whether

\[
\frac{M_j - M_j^1}{(1 - \alpha)q(r_1, fe)} \leq MS_e/n
\]

where \( n = 360, MS_e = 28.8 \)

and \( MS_e/n = \frac{28.8}{360} = 0.28 \) for the DAP(M)

test and age.

Thus we obtain the top row of our table

0.78, 0.93, 1.02, etc. \((0.28 \times 2.77), (0.28 \times 3.31)\), etc. These top row values are the critical values at the number of steps apart (range).
4. Lastly, all the differences of the table are compared with the significance levels in the top row. Working from the right hand side in the top row, \( M_6 - M_1 = 12.9 \) is greater than 1.13. Similarly, 3.4 > 1.13, 2.0 > 1.13, 1.3 > 1.13. But 0.6 < 1.13 and therefore is not significant.

In the second row, \( M_6 - M_2 = 12.3 \) which is greater than 5.8 > 1.1, 1.4 > 1.1, but 0.7 < 1.1 and is therefore not significant. This is therefore repeated for all the rows.

This procedure was repeated for all the other DAP tests (DAPW and DAPS) and hence the results that are presented in chapter IV, Tables 4.8, 4.16, 4.18. The only variation was the \( f_e \) and \( M_{se} \) value as follows:

- On the DAP(S) test and age, \( M_{se} = 37.9 \)
  \( f_e = 354 \)

- On the DAP(M) test and school, \( M_{se} = 30.6 \)
  \( f_e = 356 \)

- On the DAP(W) test and school, \( M_{se} = 37.9 \)
  \( f_e = 356 \)

- On the DAP(S) test and school, \( M_{se} = 36.3 \)
  \( f_e = 356 \)
- On the DAP(M) test and Teacher's Rating, 
\[ MS_e = 29.7 \]
\[ fe = 355 \]

- On the DAP(W) test and Teacher's Rating, 
\[ MS_e = 37.9 \]
\[ fe = 355 \]

- On the DAP(S) test and Teacher's Rating, 
\[ MS_e = 36.7 \]
\[ fe = 355 \]