TITLE PAGE

THE RELATIONSHIP OF PERSONALITY AND LEARNING STYLES WITH SCHOOL ATTAINMENT OF PUPILS IN PRIMARY SCHOOLS

BY

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A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL, AHMADU BELLO UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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DEDICATION

To "Ibeji" and all who have contributed to my education.

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The undersigned certify that they have read and commend to the Post Graduate School for acceptance a thesis entitled THE RELATIONSHIP OF PERSONALITY AND LEARNING STYLES WITH SCHOOL ATTAINMENT OF PUPILS IN PRIMARY SCHOOLS submitted by GABRIEL ADEGBOYEGA ADEYANJU in partial fulfilment of the requirement for the degree of Doctor of Philosophy in Education (Educational Psychology).

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ABSTRACT

One of the most important things parents are anxious to know about their children at the end of each school term is the average academic performance of these children. Whereas educational psychologists have researched various means by which learning could be improved - an area that has attracted least attention from literature review in Nigeria - is the learning style of pupils. This is the characteristic way of learning of individuals or the individual's approach to learning which in turn determine how the individual utilizes his abilities to solve problems. It was the investigator's view that the learning styles and personality traits of pupils affect their school attainments.

This research was therefore aimed at determining the relationship of learning styles and personality with primary school attainments.
Three learning styles were identified for this purpose.

a) The divergence-convergence learning style (Hudson, 1966)
b) The reflective - impulsivity learning style (Kagan, 1965)
c) The field independent-dependent learning style (Witkin, 1965).

In terms of personality dimensions, Eysenck's and Hudson's personality traits were adapted for the study.

The learning style tests adopted from Hudson (1966),Kagan (1965) and Within (1965) respectively were individually administered and scored with emphasis on number of correct scores, wrong guesses, the time taken before the first response and the mean time taken for each of the right answers. Inter scorer reliability of the Uses and Elaboration was 0.78 and 0.81 respectively after it was subjected to Spearman's attenuation formula.

The reliabilities of the seven personality traits adopted for the study range between 0.75 and 0.89 after they were subjected to Spearman's attenuation formula. The Reflectivity and Field Independence test items were subjected to Item Analyses. This led to the elimination of four reflectivity and five field independence test items. The spilt-half method of reliability was applied to the Non verbal Reasoning Test which resulted in a reliability co-efficient of 0.71.

Correlation matrices, ANOVA, Partial correlation subprogramme of the SPSS and factor Analyses were used with the aid of Iya Abubakar Computer Centre to test four hypotheses.

Three Hundred and Fifteen (315) pupils were randomly sampled for the study but only 277 qualified for analyses. There were divided into two groups - Group I (hereafter

referred to as Private Schools,
N = 96) and Group II (hereafter referred to as Public Schools, N = 181).

Anova analyses indicated that the divergers, reflectives and the field independent children were significantly better in school attainments than their corresponding convergers, impulsives and field- dependent counterparts at levels of confidence ranging between 0.001 and 0.05. In all, divergence came out to be more significantly related to school attainment than the other learning styles researched.
This supports Getzels and Jackson's (1962) classical findings on the subject.

There was also the discovery that the effects of learning styles on attainment significantly superseded the effect of general ability of the Non Verbal Reasoning Test traits NVRT. However, when NVRT was partiall'ed out of the correlation between attainments and seven personality traits the relationship failed to reach significant levels except aAuthoritarianism which recorded 0.01 and 0.05 levels of significance

and T scores of 0.03 and 2.10 for Mathematics and English Language respectively. Seven factor Analyses gave general indication of various dimensions of the relationships of learning styles, personality and attainment. Findings indicated that learning styles and attainment accounted for 40 - 49.2 per cent of the total common variance of the study.

The disovery that divergence, reflectivity, and field independence were more significantly related to better school attainment calls for encouragement of these styles in children. The findings of this study which underscores the relative importance of the Non Verbal Reasoning Test (AH4 Intelligence Test) vis-a-vis the importance (of this type of test for prediction of school attainment) of learning styles with respect to school attainments calls for less dependence on this type of test for prediction of school attainment. Furthermore, our findings call for reinforcement of authoritarianism in learning operation. This was the only personality trait discovered to be significantly related to attainment.

Finally, further research was recommended to identify the factors that promote the learning styles which have been discovered to be positively related to school attainments.

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ABBREVIATIONS

P	=	Probability level at which a Null hypothesis was either accepted or rejected.
df	=	Degree of freedom
rtt	=	Reliability coefficient
0.05	=	Five out of hundred
0.01	=	One out of a hundred times
Elab	=	Elaboration Test (Divergence test)
Uses	=	Uses of Things Test (Divergence test)
KT-G	=	Kagan time, that is, time used before the first response to stimulus object divided by the total number of guesses before the right answer. This is an index of Reflectivity score.
WT-G	=	Witkin time, that is time used before the first response to stimulus object divided by the total number of incorrect guesses. This is an index of Field Independence score.
NVRT	=	Non Verbal Reasoning Test.
Neu	=	Neuroticism a dimension of Eysenck's personality trait.
Extra	=	Extraversion, dimension of Eysenck's Personality trait.
Lie	=	This scale of twelve items in Eysenck's personality inventory has capability of identifying any inconsistent subject in his response to various questions posed. Such subjects are readily weeded out as their responses are not reliable.
Defence	=	Defensiveness. One of Hudson's personal qualities - (personality trait).
Auth	=	Authoritarianism. Hudson's personal qualities (a personality trait)
Socon	=	Social Conformity. (Hudson's personality trait)
Rigid	=	Rigidity - Another personality trait by Hudson.
Fee	= =	Freedom from Emotional Expression - the last personality trait by Liam Hudson.

Kagan C = Kagan correct scores, that is, the number of correct scores subjects have in the Kagan Test (Reflectivity/impulsivity learning style)

Witkin C Number of correct scores in Field Independence Test.

CHAPTER I

INTRODUCTION

1.1 Most people in developing countries have a feeling that education is the back bone to all forms of progress. But it would seem that in most African countries the strength of any education system should be identified from what transpires at the primary school level. The Nigeria National Policy on Education conveyed the idea that primary school is the key to the success of failure of the entire educational system (1981:2). Also, the Nigeria Education Research Council document on Perspectives of Quantities and Quantities in Nigerian Education also sumbitted that in keeping with the educational philosophy of "developmentalism", the primary school should be seen as the embryo of the entire education system (1980:14). This is probably because the developmental stage of primary school age is often referred to as the period of formative years. In view of this, there is good reason to feel that the period should be vital in terms of the education of the child (Coon, 1980). Rapid development of the attitude

to the acquisition of basic skills required for learning, socialization and adjustment are perhaps a few of the reasons why the period of primary school age is important (Child, 1978). Infact, by age twelve, when the child is leaving the primary school, it is assumed that the child has developed most of the basic cognitive and personality traits he requires for future knowledge acquisition and living (Havenman, 1972).

In the Nigerian context, evidence of the emphasis on primary education abound. The degree of government's investment and the national response to the launching of the Universal Primary Education in 1976 is a reference point. Until recently, many state governments operated a free primary school system and some state governments still do this. A greater appreciation of the importance of primary education is possible from an examination of its philosophy and objectives as paraphrased in a document by the NERC (1980).

According to the document,

> the elements of the complete structure must be embodied in its primordial make up. In addition, it must initiate the endeavour to promote relevance and comprehensiveness in its curriculum offerings.

It is however important to note that in spite of the awareness of the importance of this level of education and the input thereto, much of the wastage

in our education system seems to be largely a product of what transpires at this level of the education ladder (Shaikh, 1972). The wastage includes premature termination of formal education, mass academic failure, difficulties in placement for further education and employment, delinquency and retrogression to illiteracy.

Many of those who manage to have placement in higher institutions at the secondary level are known to have suffered great casulties. A major reason for this among others according to the Test Development and Research Organization (TEDRO, 1972), an arm of the West African Examination Council, is the poor educational foundation of pupils in the primary school. Table 1.1 indicates the degree of casulties after five year work in the secondary school, viz:-

Table 1:1

School Certificate Results (WAEC) 1976 - 1983

Year	Total Candidates	Pass	Percent	Failed	Percent
1976	129,543	55,952	43.9	69,614	53.73
1977	89,993	38,830	43.20	51,163	56.80
1978	175,431	122,027	69.50	53,404	30.50
1980	193,167	81,576	42.00	11,591	58.00
1982	254,330	109,330	42.98	145,000	57.01
1983	450,572	25,826	57.00	193,746	43.00

Source: The Guardian", July 15, 1984 pp. 1 and 12.

The results bother the mind of educationists, and they have been trying to identify reasons for the poor performance. The research work of Durojaiye amongst others is well known for his contribution in this area (1974:35-39, 1975:36). Among the factors he identified as contributing to poor performance are:

a) Socio-economic status
b) home experience
c) pupils' aspiration
d) pupils' attitude to work
e) pupils' industry, punctuality, regularity and honesty
f) parents' attitude towards their children's school performance
g) reward, punishment, permissiveness-control
h) achievement motivation; and
i) encouragement of children's scholastic efforts.

Making known his research findings on the same subject, Aboyade (1979) suggested that the school should employ teqhniques capable of influencing basic human attitudes in order to develop in pupils the self discipline needed for normal educational growth. This follows closely Mukherjee and Ninyio's application study (1981) on factors of home background, school

progress and attitude on pupil's performance which discovered that successful children of advantaged homes tended to differ from others in their attitudes towards formal and informal school groups.

Associated findings on factors of success in school operations include teacher's professional qualifications, school facilities and socio-psychological background of the children,(Belvins, 1983).

Whereas some of these research works are far reaching in scope and relevance, most of them are surprisingly restricted to areas of environmental variables. This is why the search for more efficient learning variables must ,continue, especially in a situation where failure rate has continued to increase. The impression one gets from the scope of the available researches is the general assumption that once environmental variables are controlled optimum learning will be gained. According to Bloom (1974), the limitation inherent in such an assumption is that the actual make up or disposition of the learner in terms of individual's characteristics has often been assumed.

If individuals are known to have different apporaches to learning and methods of tackling problems, is it not possible that these characteristics will have some relationships with attainment especially

if the teacher is able to recognise and adjust to the characteristics? Gray agreed with the above line of thought when she remarked that there is great wisdom in the feelings that one of the major difficulties in educating the child is the ability to diagnose and adapt to individual learner's characteristic approach to learning (Gray, 1978). According to Kagan (1971) a concept which is related to the mode of perceiving, remembering and thinking, apprehending, storing, transfering and utilising information should be helpful to teachers and pupils in improving school attainment. This is an area researchers tend to shy away from.

The limitation of the present probably misconceived assumption about emphasis on environmental variables was highlighted by Shuaibu (1983) in the discovery that the nature of grouping pupils togehter and the speed at which the teacher deliver his lessons are variables which have failed to recognise the importance of unique individual differences in learning styles among pupils.

Equally important in assessment of individual differences are the personality characteristics or personal qualities that relate to efficient learning in different disciplines. There is the possibility that an oversight of this has continued to make the

goal of improving the achievement levels of our pupils more difficult. Child (1978) viewed this situation very seriously as he was convinced that varieties in performance are not entirely a question of intellect, motivation or thinking skills but may depend on personal attributes (personality) which enhance or inhibit the quality of performance. Perhaps the right question to ask at this juncture is: What are these personal qualities that enhance good attainment in school? Promising and revealing as this area of research is, most of the current findings are mostly from outside the shores of Africa. This tends to militate against maximum application of the present findings.

Research in this area using indigineous sample is therefore urgently called for. It would seem that familiarity with learning style dimensions and personality characteristics should increase the teachers' awareness that some pupils will easily rebel when asked to do extra learning assignment while others will willingly accept more. There is the assumption that awareness of learning styles and personality dimensions should predispose teachers to predict easily the techniques which are approximately suited for given individuals. Besides, it would seem that the problems posed by the limitation of our knowledge in this area assume a greater dimension in

view of our over-reliance on classroom tests for educational and vocational placement. Most classroom tests in primary schools are sometimes a replication of intelligence type tests in structure and anticipated responses.

But the present meagre knowledge, mostly British and American, tends to indicate that pupils who have low scores in a particular intelligence test are not necessarily poor in other types of cognitive and perceptual tasks (Hudson, 1966; Witkin, 1968; Riding and Dyer, 1983). In addition, there is the feeling that creative children may not always perform very well in intelligence type tests (Hudson, 1967). What this indicates is that some school examinations could easily obscure the fact that slow learners are not uniformly impaired in all forms of cognitive functioning. In the words of Mukherjee (1978), these are the disadvantaged pupils in our education system. But the question could be asked:

Could we not use the resources of these deprived individuals to good advantage by helping them to work out life adjustment strategies thus reducing educational wastages? This is a major area where the awareness of learning styles and personality dimensions can be of considerable use. It is with this fore-knowledge, the importance of primary school education, the over-emphasis of current researches on external factors

of learning and the assumption that learning styles and personality traits could be hidden factors which could reduce the present rate of wastages that moved the investigator to want to research into three major learning styles and seven personality traits.

1.2 Statement of The Problem

The problem of this research was to determine the relationship of personality and learning styles with school attainment of pupils in primary schools. Unlike the existing researches which have investigated the importance of such environmental variables such as parental education, work, income and home background on school attainment, the present effort seeks to go into a more personal variable. This is the individual's characteristic approach to learning or solving a problem in terms of various types of learning operations. It was also assumed that such characteristics are linked with personality characteristics (Lee, 1972, Child, 1978). Since researches on environmental variables have proved inconclusive, (Brunner, 1968) the need for a search for more fundamental variables arises. Learning styles and personality dimensions are two relatively new areas of research that have attracted less attention of researchers.

For the purpose of this study, the following learning styles were therefore selected:

i) Divergence-Convergence learning style (Hudson, 1966).

ii) Reflectivity-Impulsivity learning style (Kagan, 1965).

iii) Field independence-Dependence learning style (Witkin, 1965).

The personality traits/factors selected for study include Extraversion-Neuroticism, Eysenck (1965) and Hudson's (1966) personality traits of:

i) Defensiveness

ii) Rigidity

iii) Authoritarianism

iv) Social conformity

v) Freedom of emotional expression.

The rationale for selection of these learning styles and personality traits are note worthy. The general assumption that they are probably more related to school attainment, their comprehensiveness, the numerous conflicting results from their use and the limited scope of research in this area especially in Nigeria gave the investigator the impetus for wanting to delve into the selected personality traits and learning styles named above.

In view of the extensiveness of the topic of this research the following questions are posed to aid the researcher in pursuing the objectives of the present study:

i) What is the relationship between the level of performance in selected school subjects and the pupil's learning style?

ii) Is there any significant relationship between a particular learning style and pupil's attainment in the Non-Verbal Reasoning Test (NVRT), the AH4 Part II?

iii) Are there any significant relationships between each of the learning styles?

iv) What is the relationship between the level of performance in selected school subjects and pupil's personality traits?

v) Are learning styles more related to school attainment than personality traits?

1.3 Basic Assumptions

The following assumptions were made in respect of the planning and execution of this study:

1. Eysenck and Eysenck's (1965) work on personality traits indicated the possibility of measurement of the degree of extraversion-Neuroticism with the use of the Junior Eysenck Personality Inventory (JEPI) (1965). Also, Hudson's

use of the Personal Qualities Questionnaire (1966) indicated the possibility of measurement of such personality traits as Authoritarianism, Freedom of emotional expression, Defensiveness, Social conformity and Rigidity. The measurement of personality traits for the present study was based on Eysenck and Eysenck (1965) and Hudson's work (1966). This was however with some minor alterations in vocabularies especially those that are culture-bound.

2. Kagan's Matching Familiar Figures Test (MFFT) was used for classification of the Reflective and the impulsives (Kagan 1966). Except alterations made as a result of item analyses conducted, the tests were scored according to instructions in the manual. For classification purposes, the following were utilized for the study:

a) Number of correct solutions (Kagan C). Subjects who were classfied as reflectives were those on or above the upper 25% rank (Kagan, 1966).

b) Timing. This was the amount of time taken before the correct responses to each of the questions. The total meain time divided by the total number of guesses made by

the subject (KTC) also gave the reflectivity score of the pupils. Subjects placed on the upper 25% of this score continuum were classfied as reflectives while those on the lower 25% were classfied as impulsives.

3. A modified Embeded Figures Test (EFT) was used for categorization of the Field Independence/ Dependence dimension. (Witkin, 1967). The following readings were taken for classification purposes:

a) Number of correct answers. Pupils placed on or above 25% upper rank were categorized as Field independent. This amounted to Witkin C score. Pupils on the lower 25% rank were classified as field - dependent.

b) WTG Score: This was derived from the mean time spent before the correct response to each of the stimulus figures divided by the total amount of guesses. This gave the field independence score. The higher the score, the more field independent. Those on the upper 25% were classified as field independent pupils while those on the lower 25%% were classified as field dependent.

4. For Divergent/Convergent classification the following tests were adopted:
   a) Uses of Things Test (Uses)
   b) Elaboration Test (Elab)
   Subjects who placed on or upper 25% were classified as Divergent in learning style (Hudson, 1966).
   Pupils placed on the lower rank 25% or below were classified as Convergent in their learning style.

1.4 Hypotheses

The following hypotheses are proposed in pursuance of the objectives of the present study:

1. There is no significant difference in the primary school attainments between the
   a) Divergent and convergent children
   b) Reflective and impulsive children
   c) Field independent and field dependent children.
2. There is no significant relationship between attainment scores and learning styles of pupils in Primary schools when the effect of the Non-Verbal Reasoning Test is partialled out.
3. There is no significant relationship between selected personality traits and school attainment when the effect of the Non-Verbal

Reasoning Test is partialled out.

4. There is no significant pattern in the factor analysis of the variables of learning styles and attainment scores so that the first factor would have these variables accounting for the largest common variance.

1.5 Justification for the Study

Cognitive style encompasses perceptual, intellectual and personality functioning. It tends to cover cognitive functioning more comprehensively than the usual intelligence and attainment tests which emphasize only intellectual functioning. Cognitive styles extend to the realms of personal functioning. It is, therefore, expected that it should reveal much more about the individual pupil characteristics. This could be one of the factors of success in schools. It is knowledge such as this that is lacking in the present system. This is why it is felt that research in the field should bring to the awareness of professionals the all-important role of cognitive style and personality in learning and school attainment.

The alarming high rate of failures in our school system as highlighted in the chapter is a major concern to educators (Shaikh, 1972). It is, therefore,

hoped that an understanding of pupils'learning styles may have significant implications for the teacher's methods, assessment and placement in school.

Witkin, Moore, Goodenough Cox (1975) and Ducbler (1979:226-232) were positive in their findings on the effect of sensitizing teachers to the implications of learning styles. Indeed, according to Doebler (1979) sensitizing teachers to the implications of learning styles does improve adaptability of teachers for the teaching learning process. As it were, their findings were purely British and American. These have to be validated for our culture and school system before we can rightly assume their relevance.

The findings in the present study should help in modifying teachers' attitude to learners when they become aware of learning-style and personality dimensions of their pupils. This is with respect to alerting teachers with the characteristics of various learning styles and the knowledge of how best to deal with pupils of different learning style in order to promote easier adjustment. It should also be a way of maximizing learning. According to Child, varieties in performance are not entirely a question of intellect, motivation or thinking skills, but may depend on the personal

attributes (personality traits) which can enhance or inhibit the quality of performance (1978). It is the belief of the researcher that this fact alone is sufficient to justify continued research in this field in Africa and especially in Nigeria where up till recently researchers have relatively shied away from this field.

1.6 Delimitation

This study was planned to include only a sample of primary schools in Zaria environs. In this respect, population sample which was based on opportunity sampling included both private and public schools. Sampling was decidedly restricted to Zaria environs (277) because some of the vital tests used for the study were individualized ones which required a lot of time. In order to make the study practically feasible, the sample had to be limited. Besides, since research literature abound in the environmental conditions of learning, this research has limited itself to an area where research output is very limited (Lee, 1972).

1.7 Limitations

Most of the tests administered for this study were English and American in origin because there were no alternatives known to the researcher in the review of literature on this subject. However, the instruments were known to have been specially constructed so as to be as free as practicable from cultural bias. The JEPI (Eysenck, 1965) has been used in Asia, Iran, Uganda and Ghana (Lovegrowe, 1975:32). Kagan's Matching Familiar Figures Test and Witkin's Embedded Figures Test have additional advantages as they are non-verbal. The limitations inherent in these tests have greatly been reduced as only the modified forms of these tests were used for the present study. These were subjected to Item Analyses and reliability testing. The reliability coefficients have been documented in chapter III.

1.8 Definition of Terms (Operational Definitions)

Authoritarianism — The authoritarian person tends to be extremely deferent to superior authority while firmly exercising his own authority over subordinates. He may also conform closely to the group. He is therefore responsible, obedient and has respect for adults (Hudson, 1966).

Cognitive Style	An individual's preffered mode of problem-solving, thinking or learning. Such preference may be conscious or unconscious and specific to many or only a few tasks.
Converger	One who tends to be better finding single correct solutions to concrete problems than at producing many different solutions to problems.
Creativity	Ability to produce original ideas or new solutions to problems.
Defensiveness	To be defensive implies the predisposition to be wary of attack. Other characteristics of defensiveness in the context of this study include slight effeminacy gentleness, courage and manliness (Hudson, 1966).
Diverger	One who tends to be better at producing many solutions to open-ended problems than at solving problems which have a single correct solution.

Embedded Figures Test (EFT)	A test designed to measure field-dependence/independence. The subject has to distinguish geometrical figures from backgrounds which camouflage them.
Extravert	A relatively carefree spontaneous person who likes to spend a lot of time in social interaction and whose interests are mainly directed towards the outside world of things and events.
Field Independence	A dimension described by Witkin (1954). It measures psychological differentiation in area of perception, Field independent people tend to be good at separating parts of the perceptual field from the whole.
Focusing Strategy	A strategy for concept attainment which involves holding in one's mind, after the first instance, all possible hypotheses about the concept, and then eliminating the incorrect,
Freedom of Emotional Epression	This personality dimension include such characteristics as being effeminate, enthusiastic and having some degree of self-control.

Impulsivity	A dimension devised by Kagan (1966). The impulsive person is apt to offer solutions to problems too quickly without adequate consideration. He is willing to guess as many times as possible until he arrives at the correct answer.
Intelligence Test	A test seeking to measure intelligence or some aspect of intelligence.
Introvert	A withdrawn and relatively serious minded person who is more interested in ideas, imagination, and inner life than he is in social interaction and other exterior events.
Matching Familiar Figures Test (MFFT)	A test for children in which a familiar figure (e.g an arm chair) must be matched with one exactly the same chosen from a number of alternatives. The mean response time for the first response to the items serve as a measure of impulsivity/reflectivity.
Non Verbal Reasoning Test (NVRT)	A general performance (intelligence) test made up of sixty five non verbal reasoning problems. It tests the

ability to recognise relationships, similarities and differences in figural patterns, speed, and precision in answers. Only 10 minutes was allowed for this test.

Open Ended Test — Here used for any test in which the aim is to produce as many different good answers to the items as possible, rather than to find one single correct solution.

Personality — A specific attribute of an individual which may always in principle and often in practice, be measured on a scale. The ends or poles of the scales are often designed by adjectives or descriptive phrases opposite in meaning, such as good-bad or field dependent/ independent.

Private Primary School — A primary school which is owned by an individual or group of people or voluntary organisation. Such a school receives no financial subsidy from the government, but depends on fees charged for its operation.

Public Primary School	A primary school system which has an unrestricted admission policy and in which fees are not normally charged. The local government is responsibile for all its finances and administration.
Reflectivity	A dimension devised by Kagan (1966). The impulsive person is apt to offer solutions to problems too quickly without adequate consideration, whereas the reflective person likes to be sure he has the right answer before acting. Because he always makes effort to weigh alternative answers in a given problem situation, he spends more time before he arrives at solutions.
Rigidity	This is an individual with a relatively unyielding personality. His characteristics also include mild eccentricism, having set opinions and some degree of sensitivity.
Social Conformity	The social conformist in the context of this study is an individual who mixes well socially. He is

well mannered, a good team member and he is relatively neat and tidy.

Strategy — A particular method of solving restricted problems. This may be used in several different situations where similar problems arise.

Threshold — A theory which states that, above a certain minimum level of intelligence, there is no relationship between I.Q and creativity.

Uses of Things Test — A test in which the subject has to think of as many uses as possible for some common place object such as a light bulb or broom.

SUMMARY

The problem of this research was to determine the relationship of learning styles and personality with school attainment. This Chapter has given an overview of the major areas in which this research was going to focus. Three learning styles, seven personality traits and pupil's attainments in four major schoolsacademic subjects supply the raw data required for this study. With a population sample of pupils from fee paying and non-fee paying primary schools in Zaria environs, the stage was set for the research with four working hypotheses. The hypotheses focus attention on the relationship between learning styles and attainment; between learning styles and the Non Verbal Reasoning Test and between Personality and attainment. The fourth hypothesis sough to determine the interraction of learning styles and personality in predicting attainment.

CHAPTER II

CRITICAL REVIEW OF RELATED LITERATURE

This study presupposes the need for a critical review of related literature to enable a thorough examination of current views of educators and researchers pertinent to a greater understanding of the concept of differentiation called cognitive styles and personality as they relate to school attainment. In this respect, literature has been reviewed in the following order:

2.1 Discussion of the concept of learning styles and varieties of learning styles.

2.2 Discussion of the concept of Field Indepencence Dependnnde learning styles as these relate to attitude, attainment, teaching methodology, sex differences and personality traits. Literature on the various methods of identifying the Field Independence - Dependence learning style was also highlighted.

2.3 Convergence - Divergence dimensions as these relate to school attainment and personality traits. The problem of identification by

previous researchers was discussed.

2.5 Review of personality theories with special reference to Eysenck's Junior Essenek personality Inventory (1965) and Hudson's "Personal Qualities (1966) as these relate to school attainment.

2.6 Summary. Highlighted here were specific areas that have been hitherto overlooked or neglected by researchers, areas where researches are inconclusive or conflicting and the consequent problem area that will be the focus of the present effort.

2.1 Definition - Learning Styles

The term cognitive styles or learning styles are often interchangeably used. Gray (1977) defined learning style as an individual's way of learning or an appro
or an approach to learning which in turn determines how the individual will utilize various learning abilities to solve problems. Kagan (1971) defined it as the individual's variation in modes of perceiving remembering and thinking. It is a distinctive way of apprehending, storing, transfering and utilizing information. According to Witkins (1973:2), learning style should be seen as a characteristic mode of functioning that we show throughout our perceptual and intellectual activities in highly consistent and pervasive ways. This definition tends to have improved

on others. It added the dimensions of stability and consistency.

Shuaibu and Ogunshola (1983:1) also added the dimension of instructional methodology. According to them, learning style is the individual's disposition towards instructional methods and information processing. Whitehead (1981:69) like Gray, highlighted a few other dimensions - problem-solving and the concepts of consciousness and unconsciousness. From the above, it would appear that a factor basic to differentiation in learning efficiency is the learning style of an individual.

The definitions highlighted are therefore important because they are attempts to indicate the global view of the concept of learning styles and the various dimensions in which the researcher is likely to be interested. Thus, it is pertinent to ask:

What are the characteristics of individuals who use the same learning style, and what are the differences between them? Do individuals with a given learning style have advantage over others who use a different learning style especially in school attainment?

2.1.2 Varieties of Learning Styles

Extensive (non African) researches Witkin (1962; 1968) Kagan (1965), Hudson (1965, 1967), Gray (1977), Kagan Roseman (1961), Dyk and Witkin (1965), Goodenough and Karp (1961), have attempted to dichotomise various learning styles: These include the conceptual tempo of Reflectivity/Impulsuvity or the global and articulated dimensions (Kagan 1962), the Field Independence and Field Dependence (Witkin, 1965), and the Divergence-Convergence dimensions of Hudson (1966). Gray (1977) preferred a more individualized classification of learning styles. She identified four types viz: Rigid, Undisciplined, Anxious and Creative learning styles. As it were, Gray's dimensions appear to be simple replication of Kagan, Witkin and Hudson's dimensions put in different words or nomenclature. Furthermore, Gray's classification tend to show that learning styles are closely related to personality. This is with particular reference with Esysenck's Introversion-Extraversion and Anxiety-Stability dimensions.

2.1.3 Cognitive Preferences

In broad terms, cognitive preference may be viewed as an individual's preferred mode of attending to information or talk as overtly demonstrated through a choice made out of options presented in a preference test item. This looks apparently the same as

definitions reviewed for learning or cognitive styles. Perhaps the only apparent difference is the fact that cognitive preference represents an overt expression of a cognitive style. Brown (1975:50) was however of the opinion that the difference is not a slight one. According to him, there is no justification from research to assume the equivalence of cognitive preference and cognitive styles especially since there is no evidence to suggest that particular cognitive prefernce choices are related to particular cognitive activities. However, in spite of the above lack of concensus, it would seem that even on the basis of available scanty information, researchers in Science Education continue to work on the premise that cognitive preference and cognitive styles are equivalent (Tamir, 1977, Timir, 1981, Shuaibu and Ogunsola, (1983) These have utilized one form or another of Heath's Cognitive preference Test (1964). Heath's instrument was aimed at identifying four cognitive styles viz:

i) Memory or recall of facts or term (M)

ii) Practical Application (A)

iii) Critical Questioning of information (Q)

iv) Fundamental Principles (P)

Again, this looks like a recast of the learning styles of Kagan (1965), Witkin (1965) and Hudson (1966) discussed in the earlier paragraphs. For instance, it is easy to see the relationship of Heath's (A) and

(Q) with Witkin and Hudson's Field Independent and Divergent learning styles respectively. Heath's (Q) again looks much like a replication of Kagan's reflective learning style.

2.1.4 Learning Strategies

Learning strategy is another dimension that is often mentioned in the literature of learning styles. It is however tempting to try to distinguish between learning style and learning strategy. Whereas a style could be said to be a characteristic way of thinking, a strategy is something more specific. It is an approach chosen for a narrower range of situations. The distinction, however, is still subject to empirical studies. As it were, the difference lies in the fact and possibility that a number of strategies can flow from a particular style. Therefore, learning styles could be said to embrace learning strategies.

Brunner (1956) and Pask (1975) are important researchers in learning strategies and have highlighted such strategies as reception strategy, focussers and scanners, serialists and holists (Whitehead, 1981:258). While learning strategies are outside the scope of the present study, operational definitions of these strategies are included in Chapter one.

Excepting the work of Okoh (1978) all other studies on learning styles viz: Babalola, (1979), Shuaibu and Ogunsola (1983) were extremely limited in scope (dealt with a single style in relation with attainment of adult students). In view of this, the scope of the present study will focus on three styles:

a) Field Independence/Dependence (Witkin, 1965)
b) Reflectivity and Impulsivity (Kagan, 1965) and
c) Divergence/Convergence styles (Hudson, 1966)

2.2.1

(a) <u>The Field Independent/Dependent Learning Style</u>

The main Field-Dependence/Independence distinction starts with perception. It is felt that some people tend to perceive in wholes, while others separate out, or differentiate in their perception. This learning style dimension of cognitive style was described by Witkin (1965) but the first suggestion that it is related to a variable which influences cognitive development was by Pascal Leon (1970). Simply stated, the Field Independent individual is he who has the ability to disembed a simple figure from a complex one. It goes with the ability to be able to discriminate and locate hidden features in a complex task. The field dependent individual finds it

difficult to accomplish these tasks.

2.2.2 Identification

The original instrument used for identification of this style was the individualized Embedded Figures Test in which subjects were made to identify and trace a stimulus figure from a complex figure. But by 1971, the Group Embedded Figures Test had been developed (Oltman, Paskin and Witkin, 1971). This is a group version of the original individualized Embedded Figures Test (EFT). The Group Embedded Figures Test (GEFT) is subdivided into three sections; the practice section (7 items) and two other sections of nine items each. Each of the two sections is to be completed in ten minutes by ten to eleven year olds. A correlation coefficient between the EFT and GEFT yielded -0.82 and -0.63 for males and females respectively (Witkin (1971). The coefficients were negative because EFT and GEFT were scored in reverse order.

By and large, it would seem the GEFT is very popular and has been used for various researches for example, Witkin (1971), Richey and Lashie (1983:195-204), Flexer and Roberge (1983:195-204) and Babalola (1979:40-48). However, the real advantage of GEFT over EFT is economy of time. While the latter is individualized in which case it allowed for direct personal interaction with the subjects - the GEFT treats

the subjects as a group thereby saving much of research time. But Witkin also devised other test instruments for identifying the Field Independence/Dependence dimension of learning styles.

The Tilting-room-tilting chair test (Witkin, 1962:38) and the Luminous Square Frame and Rod in a darkened room are two other instruments. In the former, the subject was requested to control the angle of his chair and put himself into the upright position from an almost impossible situation. The more field dependent the subject, the more he actually alligns himself with the tilt of the room. The Field Independent individual was able to fix the lumiduous rod upright unlike the Field Dependent individual. Witkin (1968) estimated the Group Embedded Figures Test (GEFT) reliability (Spearman Brown prophesy formula) to be 0.82 (Karp et al. 1971) in Lee (1972).

Apparently, the gadgets for the Tilting-room-tilting chair test were rather sophisticated, expensive and difficult to come by. This could be the reason why researchers have shied away from this method of identification of the style and have concentrated on the use of GEFT.

2.2.3

(i) Field Independence/Field Dependence and Attitude:

Since its introduction into the psychological literature by Gardner in 1953, this concept of cognitive

style has been widely examined in terms of its relation to a variety of dimensions of academic success. The evidence of the relationship of Field Independence/Dependence with attainment is however conflicting and inconclusive (Sieben, 1974). Wareing (1981:73-77) supplied empirical evidence supporting the contention that learning style, especially the Field Independence/Dependence is related to attitude formation. If this is valid, it will be a great contribution to education as literature abound in this area about the effect of attitude on academic success. Sieben (1974) also looked specifically at Science in comparing learning style with effective development of attitude using the National Science Foundation (NSF) curriculum on Elementary Science Study (ESS). Results indicated that positive attitude as measured by the Science Attitude Inventory (SAI) is greater in Field Independence or analytical subjects. In the same vein, Ann Renninger (1983:672) discovered that analysis of student perception suggests that student ratings of satisfaction and effectiveness covary ($P < 0.005$) indicating that student perceptions of satisfaction with teacher and of the teacher's effectiveness are in a sense, two sides of the same coin. But Sacacho and Dayton (1980) failed to demonstrate the above predicted interaction favouring

matched styles. This is conflicting with Di Stefano's (1969) findings who discovered that teachers and students of like styles described each other more favourably. Sieben (1974) also corroborated this.

There is however no reason for the seeming conflicting result of matching and the influence of attitude on performance. What happens in matching is that teachers with a particular characteristic (style) are paired with pupils of similar style - a case of birds of the same feather flocking together. The teacher who is slow and reflective in thinking and taking decisions will normally sympathize with a similar puipl though, it is not accepted that teacher whose characteristics are opposite will detest the approach of a given pupil leading to a sort of conflicting between the two. The affective explanation is capable of influencing the pupil's perception of his teacher and the subjects taught by the teacher. The same principle is tenable for explaining the amount of effort displayed by the pupil. If effort is a predictor of performance, it is not surprising that matching will go some way in improving academic success. This however is not as straight forward.

It would seem the negative effects of matching are as important for consideration as the positive aspects. There is no doubt that for some kind of learning contents a contrast in styles between the

teacher and the pupil might prove more stimulating than similarities. This is more true in a situation where modern interractive and child centered education is in practice - a process which makes both the teacher and pupil learners. Besides, it would appear that heterogeniety tend to aid more diverse view points and may therefore enliven the classroom. In any case, a research in the direction of comparing the effects of matching and mismatching on pupil attainment should be an effort in the right direction. It is reasonable to be aware that dynamics such as this could be a substantial variable in pupil's learning and eventually the teacher's effectiveness.

2.2.4

(ii) Attainment

Surprisingly, findings on the relationship between learning style and attainment are inconclusive. Witkin, Oltman and Raskin (1977) summarized some data indicating that each cognitive style often earn higher grades in courses drawn from curriculum areas especially well suited to their respective cognitive style. More emphatic were Cohen (1968) and Cross (1977) on the relationship of academic success and learning style of Field Independence/Dependence. Cohen and Cross discovered that the Field independent individuals are often found to perform better in

school than do the field dependent especially in elementary school Mathematics. This corroborates the findings of Walters (1974), Babalola (1979) and Sieben, (1974) that the field independent individual is consistently superior in Mathematics. Sharelson's view (1971) is that the field dependent individuals are less analytic. Saracho and Dayton (1980) in Whitehead (1981) made the case stronger by recording that pupils taught by field independent teachers make greater gains in attainment than pupils taught by field dependent teachers. An unanswered question is on why the field dependent pupil should have such an advantage beside the reason of his being more analytical. Could it be that he has higher intelligence which partly contribute to his advantaged position, an area of research the present investigator would like to go into.

The evidence of the superiority of the field independent pupil is not unchallenged as evidenced by the works of Di Stephano (1970) who found no support for the position that performance on measures of formal thought is enhanced by a high degree of field independence. Indeed, the difference among the mean scores for the learning style groups was reduced to a non significant level by statistically controlling for I.Q. difference. Richey (1981) on the other hand found no significant relationship between field

independence and dependence as measured by GEFT and a Junior College student ability to locate and identify anatomical structures.

This was why Richie (1981) suggested that the use of tests of learning styles as predictors of student performance should be approached with caution. With this, researchers cannot afford to rest on their oars for it is a direct challenge for more thorough research in order to resolve the inherent contradicting evidence.

2.2.5

(iii) Teaching Methods

Closely associated with attainment is teaching methodology. In addition to the evidence cited in relation with attitude development, authorities tend to agree here that an understanding of learning style differentiation can greatly help in improved teaching methods. This of course is of direct relevance to teacher-effectiveness. Excepting Seracho and Dayton's submission (1980) in Whitehead (1981:669; Wu, (1967) Sieben (1974) and Reninger (1981) agree that there is a relationship between learning style and specific teaching methods. For example, Wu felt that field dependent teachers and students are more content oriented while Walter and Sieben (1974) suggested that a globals have more

success in text book programme they require more guidance than the analytical articulated students who perform better in an open self-directed environment.

Gates (1971) reported a wider difference amongst field dependent students than field independent students. From his characteristic conceptual definition of field independence, it is feasible to think that the field dependent teachers and students may likely prefer team problem solving situations while the field independent individuals would prefer situations that call for independently generated problem-solving strategies. This is a view similar to Synder's (1983:668).

From the foregoing, the view that the field independent students always have an edge over their dependent counterparts in classroom assessment is readily understandable. However, since the field dependent student will always seek teacher's help (which is interpreted as effort by the teacher) he tends to have more sympathy in the award of marks from the teacher. Unless the field independent pupil is extremely high up above his field dependent mate, it is easy for the gap between the two to be easily closed up in school attainment unless the statistical test applied is extremely critical.

More importantly, when we realize that "field" in our definition is nothing other than the teacher's verbal instructions, explanations, diagrams on chalkboard or a passage read from the text book (Mekherjee, 1978) the relevance of learning styles with methodology becomes more obvious. This is because, in order to come to correct concept formation from any or all of the above types of situations, it is likely that the children manifesting field independence will stand a better chance of achieving more than their counterparts unless the teacher pays particular attention to this individual difference. Knowledge about characteristics of various learning styles should therefore aid the teacher to be more effective. This line of thought is supported by the findings of Doebler (1979) on the effect of teacher awareness of the educational implications of learning styles on selected classroom variables. The analysis indicated significantly higher post-test scores in the experimental schools which agrees with the belief that there is correlation between the amount of knowledge on individual pupil characteristics and the effectiveness of the teacher.

2.2.6

(iv) Sex Difference

According to Witkin, boys are more field independent than girls and Renninger's (1983) research on the effects of learning styles on

perceived satisfaction and performance among students and teachers supports this. While accepting the limitations in research design involving only eight teachers and 192 students, the findings that all the female teachers chosen randomly for the study turned out to be field dependent is far reaching. This is probably not unconnected with social training especially with the society's role expectation and performance of females. But this is what we expect in Africa not Europe or America because of cultural differences.

For instance, such sayings that Women are to be heard not seen", the "place of women is in the kitchen", the practice of purdah in Islamized regions and the husband's role as the sole bread winner for the family could account for the field-dependency of women. However, in Europe and America where cultural practices are different this would not be accepted. It is relevant to know what the situation is with an African sample. The result is bound to be suggestive especially if success is attained in controlling for socio-economic factors.

In a paper on the stability of passive and dependent behaviour from childhood to adulthood, Kagan and Mass (1964:107) summarized some results of a larger investigation indicating that passive and dependent behaviour is quite stable for girls but

minimal for boys. Over 60 per cent of the correlation between childhood and adult ratings of dependency was statistically significant for females while only 9 per cent was significant for males.

A more interesting discovery was in the work of Reninger (1983) where the field dependent female teachers were teaching English Language whereas all the male teachers in the sample were teaching Mathematics. Witkin (1977) agrees that the field dependent individuals are found more in Humanities while field independent individuals remain in the Sciences or Mathematics.

It would seem that this neat line of demarcation between humanities and Mathematics requires further investigation. Is it not possible that some other variables other than the field independence/dependence are at play? Personality correlates and intelligence could give a more comprehensive explanation. Besides, is it not possible that the characteristics of field independent individual will predispose him to perform better in most school subjects other than Mathematics? It should be a wealth of knowledge to know whether the superiority of the field independent individual is confined or is wide-spread. The present effort is partly in this direction.

(v) Personality Traits

Writing on Psychology of perception, Vernon (1971:202-209) highlights some major personality traits of the field independent/dependent individuals. According to him the field independent individuals are more objective, competent, self reliant and capable of directed action. These characteristics are related to dimensions of freedom and independence of action which are qualities in the region of Eysenck's introversion (Eysenck, 1965). In line with the above was Witkin's findings (1967). His perceptual tests revealed a fair degree of relationship between perceptual traits and such personality traits as preferences for occupations involving contact with people (Field Dependence) as opposed to working alone or with a fair degree of personal autonomy (field independence). Closely associated with autonomy/dependency dimensions, Witkin (1979) also point out that the more field independent the individual the greater the tendency to structure problem solving strategies independently.

Witkin's work on Field Independence style (1969) dealt in great details with some interesting points about how mothers shape their children's personalities. He discovered that field dependent children have had a more authoritarian upbringing and have not been encouraged to be independent. The

important question here is - can we consider such an experience a disadvantage especially from the point of view of personality and school attainment? Such a finding is also an indirect way of saying that Africans, culturally known to be more predisposed to authoritatian upbringing are likely to be more field dependant. While this is a broad generalization, it should be of interest to know the general spread of this learning style amongst pupils of various background, an interesting area in which this study is going to be interested.

A reference to Hudson's work on Personal Qualities (1966) and Eysenck's work on Junior Personality Inventory is appropriate here. The traits and characteristics included in their work are quite relevant to the present study. For example, it is quite easy to identify the children who are defensive or authoritarian, social conformist or those free from emotional expression. The distribution pattern of these characteristics will aid in the better understanding of learning style concepts. The identification of the scope of relationship of these characteristics with learning style and classroom attainment should also go a long way to improve the teacher-pupil interaction. Such knowledge readily arms the teacher with the type of learning situation

that best suits pupils. This should be an effort towards improving effectiveness in teaching learning situation.

2.3.1

(b) The Conceptual Tempo of Reflectivity and Impulsivity

Of the various learning styles, this appears to be the most easily grasped and has greater relevance to the process of education. It attempts to describe the individual's relative consistency in the speed at which hypotheses or decisions are selected. Most literature reviewed agreed that impulsive subjects tend to offer the first answer that occur to them (which most of the time is incorrect). According to Whitehead (1981:39) the impulsive seem unable to alter this tendency, fails to think much before responding to stimulus objects and is liable to resign himself to failure and give up completely. There are many of such individuals in our classrooms; they are willing to give answers before the teacher concludes his questions to the class and sometimes spend half the maximum time in doing assignments or examinations.

The important point here is, to what extent do such individuals evaluate or reflect upon their answers before giving them? Is it not possible to have a better or the right answer if he is encouraged

to think more about the question before offering an answer? Or are the above characteristics so overwhelming that the impulsive child is a perpetual failure in school attainment. Otherwise what are his strengths?

Unlike the impulsives, the reflectives are generally known to be painstakingly slow and thoughful. As an individual he may never raise his hands up to answer a question unless the teacher asked him to make an attempt. The issue here is: How do we distinguish such an individual from the slow learner, the unmotivated or disinterested individual in the class? What are his actual attainment level and personality characteristics that make him what he is? There is certainly an urgent need to verify the characteristics of such individuals in our classrooms. Perhaps the starting point should be an attempt at validating European findings to open an avenue as to how best such pupils could be helped.

2.3.2

Identification

Various research instruments have been used to identify the reflectives and impulsives. This included the Matching Familiar Figures Test (MFFT). The test creates situations of response uncertainty (Lessa Robberts, 1979). It is an instrument which simultaneously presents a stimulus object with six other similar stimuli only one of which is identical with the stimulus object. The most important variables

for classification are the time taken before thefirst answer and the number of guesses before the right answer. Twelve items are given. In addition, the head movement and eye fixation between guesses and responses are regorded. There is no doubt that too much was expected of the observer or experimenter as he was being made to record too many variables simultaneously therefore making the result less reliable. It was possible to have children who will not move the head or children who are conditionad to limit their eye movement as they look at a stationary object.

The Haptic Visual Matching (HVM) measures the child's sense of feeling. The subject was made to examine a three dimensional object to which he has no visual access haptically. He was then requested to locate the objects among five alternatives presented to him visually. Again, three variables are considered. Exploration time before the first response, the number of guesses and the number of correct responses.

The picture Completion Test presents the with three sequential drawings. Four other drawings are presented only one of which is a logical conclusion of the first three stimulas pictures. The time taken for the first impression and the number of errors are recorded.

Guessing Objects (GO) is a test in which three characteristics of a common object are given. The subject is requested to guess what the object is. Time and correctness of guesses are recorded.

There is no doubt that the above instruments are far-reaching. Since our operational definition of reflectivity/impulsivity is based on time and correctness of response the instruments serve perfectly well the purpose for which they are designed in terms of face validity. Whitehead (1981) recorded substantial correlations between these instruments which go a long way to establish their reliability; for example, response time to MFFT and HVM were most highly correlated r = 0.51 for boys and 0.76 for girls. The errors on MFFT and HVM also were correlated. The most consistent set of relations involve error scores. Reflective children displayed fewer errors on the Inductive Reasoning Tests (Kagan, 1965). In effect, it could be said that the categorization of a child as a reflective or impulsive implies a combination of speed and accuracy of response.

However, since a negative correlation was expected between response time and error on MFFT, it was possible to limit administrative time by not requesting the child to offer additional guesses after his first error. According to Kagan (1965), in Whitehead (1981:324), it was not dangerous to use response time alone as an approximate index of

disposition. Such a contention was heavily supported by Prat (1983:716) who by regression analysis found that MFFT latency contributed significantly ($P < 0.05$) to final predication equation which was highly significant. MFFT error scores however were negative but not significantly related to evaluation and performance.

In spite of the merit of Kagan's classificatory method there was an inherent limitation in his dependence on the speed of response for labelling a pupil. It would seem the right level of difficulty in MFFT should be a crucial factor. Unless there is a good balance, it should be difficult to establish the relationship between the response time, correct answers and number of guesses. The level of difficulty is also important in establishing the fact that response time is a good indicator of alternative answers. For example, if the problems are fairly easy, little discrimination would be found between the two conceptual tempo especially in the speed of response and the incorrect guesse. Kagan's proposal therefore requires modification in order to guarantee reliability and validity.

Another important issue concerns the possibility of having a pretty fast response and a high level of correctness. By Kagan's definition, such a child would probably still be labelled impulsive which may not necessarily be the case. It then also becomes difficult to know how to classify the slow inaccurate

child. It will be erroneous to classify such an individual a reflective.pupil.

These objections are pointers to the effect which dependence on response time alone could have on the validity of the instrument. A way out could be an index of response time as ratio of number of incorrect guesses (KTG). It is possible to correlate such an index with any other measures of reflectivity/impulsivity. Such a ratio is hypothesized to be high for the reflectives and low for the impulsives. This is strengthened by the assumption that the reflective will make fewer errors on MFFT but will take much longer time to give any response. On the other hand, the impulsive will take much less time to give a response and yet have many more guesses. Eventually, his score should be lower because it is not the response time alone that is considered but the accuracy of response.

2.3.3 Reading Attainment

Findings on reading performance have so far been conflicting and almost American. Kagan (1965) found an association between word recognition and MFFT scores. The child who displayed long decision time and low error scores on MFFT was found to be most accurate in recognition of words. However, after intelligence was partialled out in Kagan's findings, children found to be better readers at age six (6) were equally so at age seven (7) Kagan (1965) in Whitehead, 1981:42).

2.3.4 Arts/Science Relationship With Impulsivity/ Reflectivity

Messers (1976) gave evidence to show that girls have fewer reading problems than boys but failed to discover any clear pattern between sex differences and MFFT performance. This was corroborated by Kagan, in Whitehead (1981:42). According to Kagan, maximal productiveness and mastery of principles in aspects of the Arts, Social Studies and Humanities may be hampered by excessive reflectivity. Such students may not do well in Arts subjects and it is well known that performance in the Arts require a good deal of reading competence. Messer (1976) however would not subscribe to this view because it lacks consistency. He was of the opinion that when differences appear between male and female in performance on MFFT, girls were slightly more reflective. Could this be an indication that girls are better predisposed to the sciences?

Researching the cognitive tempo and complex problem solving of 9-11 year old, Witkin (1963:716) did not only discover a significant relation between MFFT and Ravens Standard Progressive matrices (SPM) and analytical problem solving but also that reflectives had reliably greater increases in latency and accuracy across sets of SPM than the impulsives. This finding was heavily supported by Kagan in Whitehead (1983:323) who after partialling

out the contribution of Intelligence discovered that a significant relationship was not unexpected, at least from our conceptual definition of reflectivity. If more time was spent on weighing of alternative decisions or hypotheses and if the first decision was delayed for the purpose of additional evaluation, the probability is that the outcome will be nearer to correct expectation and probably better than an unevaluated choice of the impulsive individuals.

This was further validated by Pratt (1983:716) who discovered that reflective kindergarten and second grade listeners were generally more effective detectors of referentially ambiguous terms in brief tests than were impulsive inmates.

However, since most of th s attainment tests dealt with evaluation of some basic science skills it would seem reflectivity has some relationship with predisposition to science. The review of literature has also indicated a slight degree of relationship between field independence and attainment in science. It would therefore be important to investigate the relationship between Reflectivity/ and Field Independence. Besides, it would seem that the very nature and characteristics of the reflective individual should predispose him towards an all round better attainment. A research which will include attainment in all school subjects is likely to clarify the limits in the superiority of

reflectives in terms of school attainment. This is an area of interest of the present study.

2.4.1 Convergence/Divergence Learning Style

The concept of divergence/convergence dates back to 1959 and earlier when Guilford used the factor analytical approach for the study of creativity. Also working on creativity was Cropley (1967) who in a case study attempted to distinguish convergence/ divergence concepts. Cropley's work which was summarized by Victor Lee (1981) indicated that one group of subjects under study did well on intelligence tests and such academic subjects as Mathematics which had definite answers. The experimental subjects avoided arts subjects, and performed poorly in English Language. The second experimental subjects were recorded as doing outstandingly well in open-ended Minnesota Tests of creativity or Creative Thinking, but less efficiently on intelligence tests and the Sciences.

The above study agrees with the general belief about the learning style of convergence/ divergence learning style. According to Hudson (1966), the diverger is an individual who tend to be better at producing many solutions to open ended problems than at solving problems which have a single correct solution. The converger on the other hand is one who is better at finding a single correct solution to a problem than at producing many

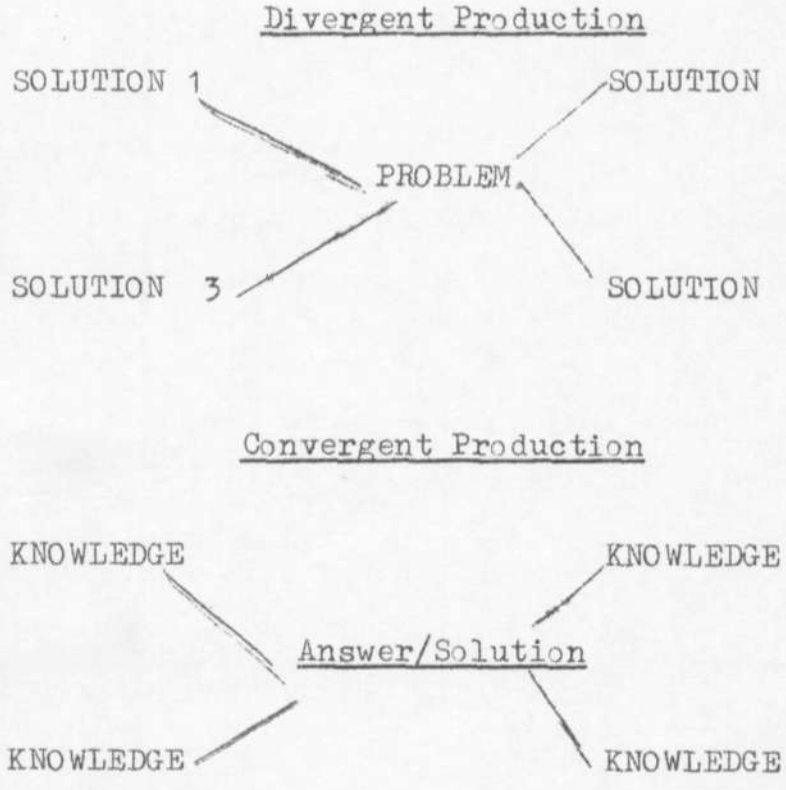
different solutions to problems having no such single answer.. In essence, the diverger is better in open ended test (Hudson, 1962).

In support of the above was Guilford, in Lytton, (1971:32) who styled convergence a "closed system-thinking" and divergence as "adventurous thinking". He argues that in divergent thinking operation we think in different directions, sometimes searching and at other times seeking variety while in convergent thinking the information lead to one right answer. This relation of convergence/divergence production is theoretically represented in diagram 2.1 below.

One important point about the operational definition discussed above is that the converger seems readily at an advantage in classroom operations. A tenable explanation for this could be found in the I.Q. test in which he is said to be extra good which need not be so. Perhaps a more important factor should be the nature of the classroom operations. What ever be the case, the verification of this line of thought is deemed very necessary for our culture. It is rather intriguing that the qualities of the diverger could not predispose him to better attainment in school. However the present effort is in the direction of making more vital information available with respect t c r r enc divergence school attainment. However, it is generally thought that the diverger is not interested in traditional

Figure 2.1

A Diagramatic Illustration of the Concepts of Divergent/Convergent Production



school operations. Unfortunately, this is the common type of tasks designed to identify some of the basic skills prerequisite for success in our educational system though such skills are not all that education is concerned about. To limit educaton to this is to favour the conformist mentality, Vernon 1966). The pupil who is good at accepting and learning what his teachers and lecturers tell him and who think and write along conventional lines, is the converger per se.

The implication of this is absolute neglect of the spontaneous independentthought (divergence). It would be interesting to locate the status and characteristics of this seemingly neglected and possibly the never-do-well individual in classroom operations. In addition, the question that requires urgent answer is: Is it possible for the inventive (diverger) to be a low achiever in classroom operations?

2.4.2 Identification

Various instruments have been used to identify the convergent/divergent style - but as the name connotes, the methods of identification are as varied and divergent as divergent learning style itself. Hudson's "Contrary Imagination" (1966) which is basically a text book on convergence/divergence thought provides many of the numerous tests often used

for identification of Convergent/Divergent Learning Style. It should be made known that not all psychologists agree that there is a very clear difference between convergence and divergence learning styles. This is probaly partly due to the fact that the whole area of convergence/diverdence is a comparatively new area and in many ways the evidence is conflicting and confusing (Victor Lee, 1981:57).

However, the basic criteria of divergent thoughts are genrally felt to include fluency, spontaneity, originality or novelty of thought, appropriateness or usefulness of productions. These give an indication of some sort of relationship with creative production even though researches are still going on in this line. Gatzels and Jackson (1962), Hudson (1966) and Ogilvie (1983) have utilized various tests for the purposes of identifying and studying the divergent/convergent learning styles. These include:

i) Uses of Objects (Unusual)

In this test, subjects were requested to think of many different uses of a list of common objects. For example, one of Hudson's subjects was able to produce 16 uses for a blanket, 14 for a barrel and 10 for a paper clip. Hudson (1966:89) was convinced about the appropriateness of this test, Quite apart from the question of sheer fluency, it

revealed that subjects could be distinguished not only by the ideas they express but by the manner in which they express them. For instance, while responding to the use of a barrel, a subject wrote: "Well, clearly, one keeps things in them, beer, or gunpowder." (Boot Polish) for - "Blacking boots and the faces of enemies." (Blankets) - "tent, sail, rug, towel, clothing, window curtain, to conceal what is happening in bed."

ii) "The Line Meaning tasks" involved visual stimulus materials whereby the child was confronted with eight different line diagrams and asked to generate meanings relevant to the line in question.

iii) A variant of the "Line Meaning task" is the Drawing Competition/Elaboration - Test - in which the subject was requested to meaningfully complete a stimulus line. Lines and curves of various lengths and dimensions were given for the test.

iv) Projective tests - in which a child was made to respond to a free hand drawn stimulus picture of a very unclear scenery. It is very similar to the Thematic Apperception Test.

The results often arrived at from the use of the above tests are far from unanimous. A major source of difference is the technicality of scoring them and the interaction of intelligence with the traits

which the open ended test seek to evaluate. Psychologists for example often see the diverger as potentially creative and the converger as potentially uncreative. Much writing on creativity rests on the assumption that creative men are open, flexible and unconventional and that the uncreative are inflexible and authoritarian (Hudson, 1966, 129).

Based on this, it would seem that it is the divergers who break new grounds while the convergers plod along cautiously in the rear. Roe and Mackinnon's study in Taylor (1964) indicate the complexity of the relationship between creativeness and divergence. The results of their research has brought significantly greater conflict, almost a confusion to this issue. This is why it was deemed necessary to investigate the relationship of divergence with other styles that are also associated with a modicum of creativity. The result should go along way in the understanding of divergence and creativity.

2.4.3 Convergence/Divergence Differences

Roe, who restricted his study to eminent scientists (physical, biological, and social) reported that these eminent researchers resemble the converger (Roe, 1953). Mackinnon, (1964) on the other hand arrived at the conclusion that creative men and women in all fields were more divegent than their non-creative colleaques an area that requires further clarification

and research. But it is possible to hazard an explanation for the differences in findings. If it can be assumed that the openess and uninhibitedness with which Mackinnon (1964) refers exist only within a relatively narrow range then we can suggest that the scientists are inhibted, the creative only less so, and the non creative more inhibited.

Hudson (1970:77-79) in an experiment found a virtually zero correlation between scores on open-ended test and scores on Intelligence tests. This confirms the validity of the instrument for identification of convergence/divergence dimensions though it is not as straight forward as this. Hassan and Butcher (in Mukherjee, 1978) reported a considerable overlap between convergence and divergence while Getzels and Jackon found divergence/convergence dimensions to be separate cognitive styles, (Hudson, 1974:54).

2.4.4 Attainment

An interesting research area of the Convergence/ divergence dimension of cognitive style is the issue of classroom achievement which is not unexpected expecially from the point of view of our operational defintion that the converger is the individual who scores highly in I.Q. tests (Hudson, 1966). Hassan and Butcher agree with this finding. If many of classroom operations are based in most cases on regurgitation of skills taught by the teacher, there

is no reason why the converger should not be rated higher in classroom attainment. But even on this, opinions vary.

Hudson's ablest Mathematicians (1966:42) and Mac Kinnon's highest intellectuals (Mac Kinnon 1962a, 1962b) were all undistinguished in school and had poor scores in intelligence tests. The above was supported by Hudson's experiments (1958, 1960b, 1961) about the classes of degrees gained at Oxford and Cambridge by groups of distinguished English men who later became Fellows of the Royal Society, Doctors of Science at Oxford and Cambridge, and High Court Judges, etc. For most of these (Divergers) poor degree classes were quite frequent, For example, thirty three per cent of future FRS at Cambridge and fifty per cent of future D.Sc's did not graduate with distinctions - or degrees with above average classification (Hudson, 1966).

In another experiment in which Hudson made special arrangement to get candidates admitted into Cambridge in a non traditional manner, that is, by the consideration of scores on open ended tests alone, the high scorers on open-ended tests had seventy eight per cent good degree passes (First and Second classes). Most of these were not high scorers in I.Q. tests. Getzel and Jackson (in Hudson 1966:54) upheld this finding as their own research found no significant difference between convergers and divergers'

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attainment. But Hassan and Butcher (1966) categorically stated the superiority of convergers over divergers in attainment though the degree of subject specialization was not specified.

One of the latest experiments by Hudson (1970: 95-102) left the issue as open as research will allow. According to his report in Victor Lee (1981:49) 15-year-old convergers were more than twice as likely as divergers of the same age group to be academically successful. By university entrance, convergers and all-rounders had distinctly better chance of winning a university place than divergers. If this is the situation, it means the society has been losing the opportunity to train potential creative individuals.

It should however be of interest to know the type of University entrance tests that were given for selection purpose. If McKinnon (1964) and Hudson's (1966) findings were anything to go by, it is possible that the divergers must have found themselves at a great disadvantage with respect to the type of tests that were given. There is also the possibility that lack of motivation or the concentration of test items in areas where the divergers have the least interest must have contributed to their poor performances in university entrace tests. The present investigator seek to hypothesize that far from placing the individual at a disadvantage, divergent qualities are more likely to be associated with an overall good and

better performance as far as primary school level attainment is concerned. This could be the case at primary school level where subject specialization has not yet taken place.

The findings of authorities like Cox (1982: 187), Hassan and Butcher in Mukherjee (1978) corroborate this. These discovered that high but not the highest intelligence (area of strength of convergers) combined with the greatest degree of persistence will achieve greater eminence than the highest degree of intelligence with somewhat less ppersistence. Roe and McKinnon, (1962b,:493) further concur with this by explaining that if a person has the minimum of intelligence required for mastery of a field of knowledge, whether he performs creatively or mechanically in that field will be crucially determined by non intellective factors. Part of the effort of the present study is to identify some of those non-intellective factors especially those that relate to personality traits.

2.4.5 Arts Versus Science Specialzation

It would seem, as important and relevant as the convergence/divergence bias towards Arts and Science is, researchers have not found enough enthusiasm to go into this field. The most reliable research in this field seems to be confined to the works of Hudson (1966, 1970) which were based on the

Cambridge University under-graduates. One of Hudson's earliest discoveries in pursuance of his Ph.D. dissertation was the difference between the scores of Arts and Science specialists in Intelligence tests. Arts specialists were discovered to have verbal biases of ability while scientists had numerical or diagramatic biases (Hudson, 1966:32).

2.4.6 Arts/Science and Intelligence Tests

In a report by Victor Lee (1981:56) Hudson was said to have discovered biases of science specialists to intelligence tests and the Arts specialists to the so called open-ended tests. This difference ranges up to ratio 4:1 for each case; a finding which shows that divergers are Arts specialists. On the surface, this looks contrary to expectation because the notion we have of a scientist is that he is a thinking, reflective, broad-minded individual who could pose hypothesis and refused to be rigid. But Hudson's findings classfied the scientist as convergers and his tabulated findings (1966:180) showed evidence that divergers were better in History and Modern Languages which was further supported by Roe (1953).

From the above, it is difficult to conclude that only convergers will be productive in a real life situation. It is possible that the relation between divergent thinking and creativity in science and technology in particular is far more complex

than our present knowledge is able to cope with.

Ordinarily speaking, Lytton (1971:42) felt that the diverger is the individual who should turn out to be a scientist. There was however a further suggestion that although the convergers turn to science and specialize in it, not all of them will be uncreative humdrum scientists as Hudson concludes (Lytton, 1971).

Nevertheless, if the converger was found to perform poorly in divergent test (creativity) possible reasons such as personality factors and level of motivation could account for this. Roe (1953) established lack of relationship between divergence and I.Q. test (r = 0.09). Hudson (1966) also found some high degree of lack of interest of convergers in open-ended tests because the potential scientist either found the questions unnedessary or uninviting and probably funny. It was also possible that the type of curricula in colleges was far remote from the actual challenges that beset the research scientist in post graduate studies.

Hudson (1966) suggested that the potential scientist has first to be a traditionalist by learning basic facts and principles, laws and already laid down methodologies which are convergent skills. It would seem then that the converger should be more predisposed to science. Kuhn (in Hudson, 1966:104) argued strongly on this by asserting that

the scientist must first be conventional before he can hope to become a revolutionary. Convergence/ divergence learning styles have been seen as representing the authoritatian liberalism dimension. In an adapted test from Hudson (1967) it was discovered that divergers have the yielding tendencies whereas convergers are opposite. The questionnaire which was revised and given first to 15-year olds and later to 16-year-olds upheld Hudson's hypothesis that the Converger was authoritarian in outlook; the results were respectable but not overwhelming. In Mukherjee's view (1978:114) the converger tend to be authoritarian because he is obedient to authority. and Kuhn (1953) also upheld this in his description of the converger as a traditionalist.

The diverger on the other hand is reknowned for his intriguing questions and disinterestedness in formalities. Sometimes, he was strongly emphatic about his belief and his likes and dislikes (Victor Lee, 1981;52). This was corroborated by Hudson's Personal Qualities Test which indicated significant differences between Convergence/Divergence styles in rigidity of attitude and social conformity. Divergers were discovered to be more self confident and to think that it is not desirable to obey authority whether it be in the form of skilled professional advice or recognizing dependence on parents. In contrast, such things as good manners,

getting on well socially and fitting in well with the team are all more important to convergers. These are qualities that most teachers would like to see in convergers and like to see in their pupils. Convergers therefore seem to possess qualities which make them popular with their teachers. This finding was corroborated by Mac Kinnon (1962b) and Getzels and Jackson (1962). Not only were divergers unpopular with their teachers, they were also found to look frequently unhappy. According to Getzels and Jackson (1962) even when divergers show academic success teachers will prefer to teach the more docile and obedient convergers.

2.2.4.7 Development

The review of convergence-divergence dimensions of cognitive styles will be a half way measure if nothing is said about the factors that have been hypothesized as responsible for these dimensions of learning styles.

Ogilvie (1983:387) reported Mednick's (1962) views in which divergence was said to depend first upon the size and quality of association reservoir of the individual-a purely associationistic theory. There was the contention that an individual without the requisite elements in his response repertoire can hardly be expected to combine them in a novel

number series. But such an explanation can only have its roots from childhood. According to Bloom (1974) on the basis of purely statistical evidence, the first few years of a child's life are of proportionately greater relevance to the formation of his personality than later ones. By about five years as much as fifty per cent of the variance at adolescence is predictable for such characteristics as intelligence, dependency and aggression. Hudson (1966:152) corroborated this view after reviewing large body of literature which made him to conclude: "if the literature that I have reviewed at length have any message it is that we may legitimately look at the early years of convergers' and divergers' lives at home." In other words, we rely greatly on the parent child relationship at home for evidence of the development of the two dimensions of these cognitive styles though findings are not as straightforward.

According to Hudson (1966:150) an upbringing based on punishment is not necessarily worse than one based on encouragement, neither is an upbringing based on the show of affection worse than one based on reality. There is no doubt that this is a revolutionary idea. Puhishment has always been associated with an unprogressive authoritarian school system which makes learning more difficult and Hudson saw nothing extreme about this.

We, however, already have some evidence about the characterisics of parents of divergers who are generally emotionally withdrawn and remote. But Getzels and Jackson (1962:61-67) gave further indication that the convergers' parents spend more time in the home, are more critical of their children and emphasize external rather than internal virtues for their children. From the above, it is only realistic to infer that the future convergers (parents themselves are convergers) have parents who express their love for the child not directly or physically, but through the warmth of their approval when the child masters impersonal practical skills. Conversely, the future divergers (parents themselves divergers) held their children much closer).

Lytton (1971:69) named series of parental qualities that tend to shape the personality of the divergent individual. The young patential diverger enjoys unusual respect from parents who, in addition, have great confidence in him to do the right thing. He was given autonomy to explore his world as he was constantly encouraged in independent activities, that is, he has opportunity for a low level of control. Hugh Lytton was not alone in this conviction as Mac Kinnon (1962), Drevdhal (1962), Lytton, (1971:70) also upheld the same belief.

In a research by Weisberge and Springer (1961) on families of 32 highly gifted nine-year-old from a population of 7,000, and who were given criterion

tests of divergent thinking, a similar finding like Hudson's came out. Parents of divergers showed expressiveness (that,is, openness in human contact) and lack of domination of their children. They accepted regressive tendencies of their children and the demand for conformity to parental values was less. It was also discovered that religion played a less powerful force in such homes. This finding was replicated by Mac Kinnon (1962). In addition, divergers as parents were discovered to have tendency to be stronly individualistic, not averse to voicing their feelings openly.

The above description tends to show the childhood days of the potential diverger as a period of uniterrupted sunshine and ideal happiness. Mac Kinnon (1962) mentioned consistent and predictable discipline whichiindicated some spanking but the non involvement in a child's private life can not be the best thing a child could have. This could be why the diverger engages in more solitary activities than the convergent individual. Hudson (1966) pointed out that children who scored highly on tests of immagination and artistry had mothers who were less nurturant and ambitious than the mothers of high scorers.

In social circumstances, the diverger was seen not to have any financial hardship in the home, th Weisberg and Springer (1961) found that the degree to which the father was very professionally autonomous was very significantly associated with children's divergent ability.

The above exposition on parental qualities which shape the divergent and convergent qualities in children seem to be straightforward and logical except in the role of punishment and discipline. The findings about the role of the school, its environment and curricular structure relate to this. If Bloom's (1974:177) and Hudson's findings (1967:152) are anything to go by, one would feel that before formal primary school education, the child has already developed much of the convergent or divergent traits that are bound to affect his schooling life. But no research has yet been conducted to indicate that the school has nothing to contribute to the emergence or groping of divergent qualities in children. However, the reinforcing potential of the school system cannot, however, be denied. In effect this should reflect consonance and therefore the possibility for higher attainment. The school can also be a source of dissonance to the child though such conflict will make learning more difficult and so attainment is bound to suffer.

In a research on creativity and curriculum structure, Ogilvie, (1973:384) in "Educational Research", (1974:126-32)) came out with the following striking results:

a) neither of the less structured environment produced children with higher sores on divergent tests and the most uncertain classroom organization gave rise to the lowest scores;

b) against Haddon and Lytton's major thesis (1968) the proposal that informal progressive teaching would promote divergent thinking abilities more than formal subject-centered teaching can at best be only partially true and could easily be a dangerously half truth;

c) formal schools tested were less inimical to creative potential and divergent expression than were the types of progressive schools tests.

d) There can be little doubt that the midroad environments were best in general terms.

From the above, there is the possibility that the proponents of progressive school system will be shooked by these findings. Kagan (1967) had similar view in his earlier writings which is an indication that the commonly held opinion that informal environments are generally more congenial to divergent/creative expression calls for a more indepth examination (Mukherjee, 1978). Torrance, Haddon and Lytton's submission (1962) therefore also require careful qualifications because with our present knowledge (which is rather confusing), generalization is dangerous.

In spite of the above however, the support for informality has been well documented in various literatures. Haddon and Lytton (1968) Torrance (1962) Vernon (1964) are good authorities. They found

11-year-old English children to be singularly superior in divergent thinking abilities when taught in informal schools. Spears and Hilgard (1964) made some qualifications, saying there was really very little evidence which directly tests and supports the hypothesis that informal schools provide the best climate for creativity. Even though Guilford (1967) would like to support the general view point, his remarks were based largely on generalities.

From the above, one cannot but agree with Victor Lee (1981) who frankly declares that the whole area of convergence and divergence is a completely new one and that the evidence at our disposal is not only meagre but also confusing and conflicting. There is hardly a better way of calling for more researches in this area, an area which has a great promise for greater efficiency in our education system. More importantly, it would seem that the superiority of convergers over the divergers in a few of the school attainment is suspicious especially in our culture where intelligence score is not of paramount importance as in English and American institutions. This is a major area of interest in the present study. If divergence implies some degree of resourcefulness and reflectivity, there is the logical assumption

that such potentials should be helpful in producing an impressive school academic performance.

2.5.1 Personality

Almost unnoticed in research literature are series of papers which attempt to describe the relationship between personality and level of school achievement. Whereas it is feasible to suggest that such factors as age, sex, ability, classroom organization, class size, teaching methods and such other related factors treated in this chapter influence the relationship between personality and school attainment, it would seem that any attempt to understand the complete causal chain associated with school attainment must include the effect of personality on the child's work in the school. Indeed, if Allport's (1963;28) definition of personality is anything to go by, which is the dynamic organization within the individual of those psycho-physical systems that determine characteristic behaviour and thought, it is suggestible to say that personality should be an important determinant of classroom behaviour and of ultimate scholastic success.

Burt (1965), Adcock (1965) and Eysenck and Eysenck (1969a) have compared and contrasted Eysenck (1965) and Cattell's (1970) classification and found out that the two approaches were basically the same.

Eysenck's extraversion-introversion (E) and neuroticism - stability (N) were arrived at by factor of analytic method. Eysenck's Lie scale (L) is 12 items was included for the purposes of internal validity. Cattell's interrelated sixteen dimensions have often been reclassified into five distinct traits viz: anxiety, extraversion, tendermindedness, liberalism and moral attitude.

A further clarification of Eysenck dimensions indicate the relationship between Cattell's and Eysenck's work. Eysenck's "E" scale provides for scores on a continuum of social extraversion-introversion on which a high score represents sociability, outgoingness and carefreeness while a low score indicates reticence, control, reliability and seriousness. The "N" scale represents a continuum of neuroticism - stability in which a low score reflects calmness and reliability. Unlike Cattell's model which combined Junior and Adult scales in the same inventory. Eysenck has a seperate inventory for children of up to 15 years and another for adults. Since the interest of the present study is the primary school age, the Junior Eysenck Personality Inventory (JEPI) was preferred. The simplicity of classification, the common occurence of the traits in primary school age children and the ease of identification recommend Eysenck's model.

2.5.2 Related Findings on Personality and Achievement

Two large scale researches (British) appear in mast literatures on the relationship between JEPI and attainment of primary school children. Entwistle and Cunningham (1968) and Eysenck and Cookson (1969) utilized 3000 and 4000 samples respectively but inspite of the size of the samples, there was no close agreement between the results.

Whereas Entiwistle and Cunninghan discovered high significant relationship between attainment and extraversion, Eysenck and Cookson's relationship failed to reach a significant level (1979). This difference in findings was augmented by Jensen's discovery in a study of English children in which "E" had little or no relationship with intelligence measures (Jenson) 1973). Lovegrove (1974) in a study of 733 American Negroes and 756 Mexican pupils corroborated this but Lovegrove failed to discover any significant relationship between extraversion and school attainment of students of Alvan Ikoku College of Education, Owerri, Nigeria. Entwistle and Cunningham (1968) however reached agreement about the negative relationship between neuroticims and school attainment and Child (1978:249) supports this.

The explanation for results cited above cannot be overlooked. Literature on the effects of extreme anxiety on attainment indicate negative relationship

although a modicum of anxiety is logically needed for effective motivation for most learning operations. If the neurotic individual is he who is filled with unnecessary worries, feelings of restlessness and general nervousness, it is not difficult to explain why he should perform poorly. Such emotional state was bound to sap the energy required for fruitful work that should yield high attainment.

According to Child (1978) custom-made anxiety scales test anxiety, achievement, anxiety state and trait anxiety which almost invariably show that high anxiety is correlated with low achievement at any age. Perhaps of consequence is the level of arousal and the difficulty level of the task at stake. The belief that as we pass from one kind of task to another the difficulty of each task affects the optimum level of arousal at which learning and performance are adversely influenced, clearly explains the findings of non-correlation between high anxiety and attainment. Yerkes Dodson's law drives home the point. The law states that as the level of motivation is increased for a given task, an optimum is reached beyond which performance increasingly deteriorates (Yerkes and Dodson,(1908)in Child, (1978)

Priding (1967) in Butcher, (1978) gave the evidence that the extraverted tend to be better at school work in late primary and early secondary school.

This seems to be in line with Cunningham and Cookson's findings (1969) though it seems that age difference is important here. While introversion could be an advantage at college and University, extraversion has been discovered to be a disadvantage. An understanding of the definition and consideration of the characteristics of the extravert would be necessary to better appreciate this. If reactive inhibition is high in the extravert, it is possible that concentration in studious tasks will be marred by involuntary rest periods and vigilance must suffer. It is also possible that the extravert will find difficulty in maintaining interest in what can be boring tasks.

Though the findings above are far from being assessed as general concensus on the state of relationship between personality traits and attainment, the attempt has been to give some theoretical explanation for differences in findings. The fact that many of the available researches are European and the meagre African findings in respect of Hudson and Eysenck's personality traits and learning styles make the present assignment an important task.

The revelation that Hudson's (1962:193) researched Personal Qualities of authoritarianism, rigidity and social conformity discriminated between the convergent pupils is helpful but Hudson did not show any interest in relating these qualities-including Freedom from Emotional Expression and Defensiveness

with school attainment an area which certainly calls for research. For example, such qualities that form the basis of Hudson's Defensiveness viz: physical toughness, slight effeminancy, gentleness, courage, affection, enthusiasm, self-control, hiding of strong feelings which characterise Freedom of Emotional Expression are largely distributed among pupils. It is therefore intriguing why researchers have shied away from these areas. The effects of these characteristics on learning styles and pupils' attainment is a major focus of the present study.

The natural questions from the review of literature that deserves urgent attention are: What do we expect as results from a Nigerian sample in terms of the issues of learning styles, personality and the relationship of these with attainment? Cultural differences make this question a mandatory one. We cannot possibly transplant findings from other cultures on ours in spite of our struggle to improve our educational system and efficiency. But discoveries in the literature reviewed have served the good purpose of providing us with the impetus and a background method required for a research in the field of learning styles, personality and attainment.

In the final analysis, worthy of being noted is the degree of sparsity of African/Nigerian based researches in this field. Excepting the major work

of Okoh (1978) on "Bilingualism and creativity in cognitive functions". the three other works that particularly relate to the subject of the present study were greatly limited to correlation study of Field Independence and classroom attainment of adults. (Babalola, 1979 and Shuaibu, and Ogunsola 1983). Lovegrove's work (1974) was restricted to Eysenck's (1965) personality traits and school attainment. The above seems to be a validation of Victor Lee's conclusion (1981) about the newness of this area of research. For a country of our size and population, we certainly need more researches in this field. This is because of the potential of this field of study in making us to understand better the important variables of efficient learning of school children.

The relative absence of literature on the scope and degree of relationship between different learning styles need also to be noted.

For example, it should be of interest to know the degree of relationship between the field independent, reflective and divergent individuals. From literature reviewed, the relationship seems to be apparent but no one is sure of the scope and no research from literature reviewed has yet probed this area. Similarly, the relationship between the Field Dependent, Impulsive and Convergent styles if discovered will go a long way in clarifying some of the conflicting findings highlighted in the review.

The researcher is also interested in the actual relationship of personality traits to school achievement. At present the degree of disinterestedness in these areas is very intriguing. It is hoped that findings in these areas will go a long way in our approach to solving learning problems of our pupils.

S U M M A R Y

The attempt in this chapter has been to highlight important related findings on the [redacted] of different called learning styles, personality and the interraction of the two in school attainment. Three distinct styles namely the Field Independence-Dependence, Reflectivity-Impulsivity cognitive tempo, and the Convergence-Divergence styles were highlighted with the major authorities being Witkin, H.A (1965) Kagan, T. (1965) and Liam Hudson (1967, 1966) respectively.

Besides the general treatment of the origin of learning styles and selected personality traits, aspects of each of the learning style with respect to education were exhaustively treated in such areas as:

a) attitude to learning;
b) general classroom performance;
c) subject (academic) specializztion especially in relation to the Humanities and the Sciences
d) teaching methodology;
f) sex differences in learning styles;
g) Personality traits and relationship with learning styles and school attainment.

In addition to the above attempt was made to highlight such areas as:

h) instruments for identification of learning styles and
i) factors for the development of different learning styles.

CHAPTER III

EXPERIMENTAL METHODOLOGY

3.1 The Pilot Study

The sample of the Pilot Study came from classes five and six of A.B.U. Staff School, Kongo (N = 81). The performance of the students in the personality tests which measured Defensiveness, Authoritatianism, Neuroticism, Lie, Extraversion, Social conformity, Rigidity and Freedom of Emotional Expression were recorded, The scores on uses, Elaboration, the Kagan and Witkin's tests, and the Non Verbal Reasoning Tests were also recorded. The school performance scores in Mathematics, Primary Science, English and Social Studies were obtained and were transformed into corresponding T-scores to allow for comparability.

When the analyses of data was done using the T-scores, certain positive findings were discerned. It was apparent that the investigator was using tests of personality in his study so the reliability of these tests had to be established before using them for the main study. For the reliability coefficients, and split half correlation coefficient were used for the subjects and each of these reliability coefficients was then subjected to Spearman's attenuation formula

of rtt = $\frac{2r}{1 + r}$ (Peatman, 1964) which eventually gave the reliability of these tests. The reliability coefficients of the tests were found to be as follows:

rtt (Defensiveness)	=	0.78
rtt (Authoritarianism)	=	0.89
rtt (Social Conformity)	=	0.80
rtt (Rigidity)	=	0.83
rtt (Freedom of Emotion Expression)	=	0.75
rtt (Extraversion)	=	0.81
rtt (Neuroticism)	=	0.75

It appears from the above list that the tests were reliable enough for the purpose of the investigator's study thought at this juncture the validity of these tests could be questioned. Besides, the spilt-half reliability computed, the use of the lie scores of pupils to weed out "independable" respondents (pupils who tend to be inconsistent in their responses) guaranteed the dependability of the scores used.

Content and face validity of the personality inventories were enhanced by the following procedure:

a) the opinions of primary school teachers were sought with respect to the meaningfulness and level of comprehension of the inventories for primary school (class 6).

b) collation of various problems on vocabulary and expressions as revealed by pupil's questions and unanswered items in a pre-test. They were requested to leave out items that were not meaningful to them.

c) replacement of identified difficult words or expressions especially those that have cultural bias with terms the pupils are likely to better appreciate.

d) requesting four teachers of English Language (two primary school teachers and two university lecturers) and two lecturers in Educational Psychology to read through the modified inventories. The language teachers were to ensure appropriateness of language while the psychology lecturers ensured that the psychological concepts in the inventories were not seriously tampered with.

The scorer's reliability in the (Uses) and (Elab) tests were also computed. This was necessary in order to be sure that the guidelines for awarding scores were strictly adhered to as outlined in section 3.3 of this chapter. The scorer's reliability which was subjected to Spearman's attenuation formula gave reliability coefficients of 0.78 for the Uses test and 0.81 for the Elaboration tests.

To guarantee validity, care was taken in choosing the objects included in this test which were supposed to be every day objects that the testees are familiar with. With this, fleuncy and originality of ideas was guaranteed. In some schools the vernacular translations of the words were given and pupils encouraged to respond in vernacular if they so choose.

In the case of Elaboration test, the criteria for scoring the test highlighted in the section on test administration helped to sustain further the reliability of the test. Furthermore, the instructions at the beginning of the test which was carefully worded aided in the production of anticipated responses. Matching Familiar Figures Test and the Embedded Figures Tests were individualized and pictorial. The first sample of these tests were pretested and scores were used for computation of Discrimination and Facility Indexes. This was very necessary as highlighted in the review of literature in chapter two. Failure of these tests to discriminate could make the research effort to be useless.

From the analysis of results, four and five items of MFFT and EFT respectively were found not to have discriminated enough. In some of these, there was no discrimination between the first upper 33% and the lower 33%. In less than 10% of maximum time allowed, more than 90% of subjects successfully solved

some of the problems which indicates a very low level of discrimination. However, for others, the level of difficulty index was too high. Less than 10% of the subjects arrived at the anticipated answers in the maximum time allowed. In both cases too simple and too difficult items from the test batteries were substituted. The post test of the batteries indicated a moderate level of difficulty as illustrated in Appendix K.

The Non Verbal Reasoning Test:

Sixty five items were presented in pictorial form and subjects were requested to choose the right answer from five alternative answers. In this context, language or cultural bias does not arise. Sampled opinion of primary school teachers indicated that the items were within the competence of primary five and six pupils. They also agreed that the problems were similar to what the children were supposed to have covered in primary school Mathematics and Creative Arts. The spilt half reliability of obtained scores after the application of Spearman's attenuation formula was 0.71.

With respect to all the tests used for this research, care was taken by the investigator to safeguard their internal validity. This was in respect with internal validity factors such as experimental mortality, experimental decay, reactive responses and motivation of the subjects (Mukherjee, 1978:392). With these careful precautions the tests used for this research and the associated findings are internally valid (Cambell, 1972).

The results presented are however limited to only significant relationsips. Since there were sever sub-groups, significant results in each of the subgroups were noted. All the conclusions arrived at in this study were based on the results of the subgroups and that of the entire population (N = 277).

The results of the pilot study were inspiring enough for the investigator to embark on the main study in which the sample of children was increased by including more primary schools into the sampling frame in compliance with the advice of the research commitee. The school used for the pilot study was however not included in the final study.

3.2 The Sample

The last form children (Primary 6) from the following schools were included in the study.

1. A.B.U. Staff School, Samaru
2. Army Command Children School, Sabon Gari
3. Kaura Primary School, Zaria city
4. Kwarbai Primary School, Zaria City
5. G.R.A. Primary School, Sabon Gari
6. Jaafaru L.E.A Primary School, Sabon Gari
7. Nura Hulda Primary School, T/Wada
8. L.E.A. Primary, School, T/Wada.

Appendix M provide the sampling frame which attempt to explain how the investigator arrived at a research sample of 315 children. Because of the overwhelming population of the non fee paying primary schools many more pupils (N = 203) were sampled from these schools compared with 112 from free paying schools. The sample from each school depended on the population of class six pupils in each school. From each classroom 25 to 35 per cent was selected using a table of random numbers to give the sample from which data was gathered for the study.

The sample was reduced by depending on the lie scores of the pupils. If their Lie scores had fallen above eight the candidate was completely stripped of

his results (Mohammed, 1980). With this, the eventual sample consisted of 277 children, 138 boys and 139 girls. Group one schools were made up of the two private schools: the A.B.U. Staff School, Samaru and the Army Command Children School, Sabon Gari. All the other six schools (non-fee paying) made up Group two schools. Group one schools consisted of 54 boys and 42 girls while group two schools were made up of 84 boys and 97 girls.

In the analysis of the results the investigator looked at all the possible forms of analysis for the boys, the girls, and all children of each of the two types of schools and also for all the children taken together (N = 277). This helped to indicate consistency of results and thereby allowing comments on validity of results.

3.3 Test Administration and Test Scoring

The investigator established rapport with the children (boys and girls) of the last form of the eight schools and when he was satisfied that sufficient rapport had been established, the investigator gave the children the tests of personality and the Arm
The tests of personality of Defensiveness, Authoritarianism Social Conformity, Rigidity, Freedom from Emotional Expression, Extraversion, Neuroticism and Lie were adapted from Hudson, (1966) and Eysenck (1965) respectively.

Hudson's and Eysenck's tests of personality were completed by the children in 15 minutes and 10 minutes respectively. The investigator later administered a pictorial Non Verbal Reasoning Test of (Messick and Heim, 1971) which was also completed in 10 minutes.

Two tests of divergence were used; one was the adapted version of Unusual Uses Test where children were supposed to give as many uses of each of six common items or objects mentioned to them.

A second test of Elaboration was also administered. The subjects were given part of the outline of an indefinite picture and requested to make or elaborate the stimulus outline to form their own contemplated pictures. There was no time limit for these two tests though it was found that most of the children completed each test (Uses and Elaboration) in twenty minutes.

The scoring of the tests were strictly made by two scorers - with the following guidelines:
For the (Uses) test,

i) A point (mark) was awarded for each use of an object. There was no maximum score.

ii) Similar uses mentioned for the same object was scored only once.

iii) The uses for any given object must be clear otherwise it attracted no score.

iv) The score of each subject was the total number of points on the six objects.

v) The scores were ranked and the upper 25 per cent were classified as divergers while the lowest 25 per cent were classified as convergers.

The (Elab) tests were also scored with the following guidelines in mind:

i) Each stimulus object elaborated on which attracted any score represented recognizable meaningful forms or concepts.

ii) No score was awarded for shapes/drawings/objects which had earlier been scored.

iii) The total scores of each subject was the addition of the points in all the tasks.

The scorer's reliability of these tests (Uses) and (Elab) were 0.78 and 0.81 respectively. The higher scorers of both the Uses and the Elaboration tests were classified as divergers whereas the bottom scorers were regarded as convergers.

The Kagan test of relectivity-impulsivity was in the form of pictures where the subject was supposed to find the exact replication of the given example (stimulus figures) among six similar alternatives. In the alternative pictures, care was taken to ensure that only one of the alternative pictures perfectly tallied with the given example while the other had

slight variations. The total set of pictures were ten and this test was administered individually by calling the subjects to appear before the investigator. The maximum time for each of the tem items was one minute and the number of guesses made by each subject per each item of these tests were recorded. The investigator has used in this research, not only the correct Kagan scores (Kagan C) but also obtained a transformed score of time and the number of guesses (KTG). Both Kagan C and KTG scores gave a measure of reflectivity of the child when the scores were high and gave us a score of impulsivity when these scores were comparatively low.

The field independence - field dependence learning style was measured in a similar manner as the Kagan tests. Witkin's test was adapted from Witkin (1970). Like the Matching Familiar Figures Test, the EFT was made up of a set of ten pictures to give a measure of field independence-field dependence. Here the investigator kept a record of guesses on each item, and the time taken for the first response (right or wrong) on each item. A transformed score of WTG (Witkin's Time divided by guesses) and Witkin C (correct answers) were computed. Like the Kagan test, this test also needed individual administration and careful recording of the scores. A high score indicated field dependence while a relatively low score indicate dield dependence.

The scores of personality tests were obtained straight from the manuals of these tests, and recorded as such. Scores in Mathematics, Primary Science, English and Social Studies were all transformed into their corresponding T-Scores for inclusion in the data matrix for analysis. The T-Scores were derived from the formula:

$$T = \frac{Y - \bar{Y}}{s} + 50 \quad \text{(Ferguson, 1971)}$$

Besides, information about the sex and the age of the subjects were obtained. All the tests are produced collectively in Appendices A - M of the thesis.

Data Matrix

The data matrix of the children was made up of the information about their sex, age, scores in extraversion, neuroticism, Lie, authoritarianism, rigidity, social conformity and freedom of emotional expression, Uses, elaboration, and Non Verbal Reasoning Test, Kagan C, KTG, Witkin C, WTG and the T-Score of Mathematics, English Language, Social Studies and Primary Science of all the children.

3.4 Statistical Methods Used for Analysis of Data

The need for the computation of means and standard deviation of all the subgroups of the sample was basic to the statistical analysis of the data matrix in order to test the hypotheses. The subgroups were:

Group I Male (N = 54)

Group I Female (N = 42)

Group I All (N = 96)

Group II Male (N = 84)

Group II Female (N = 97)

Group II All (N = 181)

Group I and Group II (N = 277)

The means and standard deviation gave a global view of the differences in the scores of each group and the entire population sample.

Hypothesis I:

There is no significant difference in the Primary school attainment between the:

a) Divergent and Convergent children

b) Reflective and Impulsive children

c) Field Independent and Field Dependent children.

The following procedure was adopted for resolution of these hypotheses:

a) From the SPSS subprogramme "condescriptive" the scores of the subjects in the Uses, Elab, KTG, Kagan C, WTG and Witkin C were ranked.

b) The top 25% high scorers were isolated as divergers, reflectives and field independent pupils respectively.

c) The lowest 25% scorers in the learning style tests were designated as convergers, impulsives and field-dependent children respectively.

d) The Anova subprogramme of the SPSS was utilized to locate significant differences in the attainments between:

i) the Divergent and Convergent children

ii) the reflective and impulsive children

iii) the field independent and field dependent children.

Hypothesis 2

Hypothesis 2 sought to determine the importance of learning styles with respect to school attainments while partialling out the effect of the Non Verbal Reasoning Test. The following procedure was adopted for resolving this hypothesis:

a) The correlation matrices of the learning styles and attainments in Mathematics, English Language, Social Studies and Primary Science were computed. (Tables 4.3.1 to 4.3.7).

b) The correlations that were significant at between 0.05 and 0.001 level of confidence were subjected to partial correlation analysis and a t-test using the formula outined in Chapter 4. This method should

give a vivid relationship between learning style and attainment especially since the Non Verbal Reasoning test which was thought to be greatly related to attainment was partialled out for the purpose of resolving this hypothesis.

Hypothesis 3

In order to discover the relationship between personality traits and school attainment, the method adopted to resolve hypothesis 2 was also employed here. Significant correlations between personality and attainment at 0.001 to 0.05 level of confidence were used as data to compute partial correlations between personality and attainment while we control for the effect of the Non Verbal Reasoning Test.

The choice of partial correlation method to resolve hypothesis 2 and 3 was justified by the capability of this technique to make available a single measure of association that was capable of describing the relationship between two variables while adjusting for the third variable (Ferguson, 1971:391). With this method, the investigator was predisposed to be able to assert the relative importance of learning styles, the NVRT and personality with respect to school attainment of primary school pupils.

Hypothesis 4

There is no significant pattern in the factor analysis of the variables of learning syles and attainment scores so that the first factor would have these variables accounting for the largest common variance.

The SPSS sub programme "factor" was used to resolve hypothesis 4. The rationale for adopting this method was vividly given by Norman et al (1975:469). Factor analytic method is the most distinct technique in data reduction capability which enables the investigator to see whether there are some underlying patterns of relationship which allows the data to be "reduced" to smaller set of "factors" or components that may be taken as interrelations in the data. Accordingly, the nineteen variables in this study were subjected to factor analysis in order to see what patterns did exist and to locate the source of the variables which were capable of accounting for observed interrelationships.

SUMMARY

The research instrument used for this study was the product of an intensive overview of related literature on the subject of learning styles, personality and school attainment. The choice of Anova, Correlation Matrix, Partial Correlation and Factor Analysis were justified in this chapter. For the purpose of this study, the population sample was divided into two distinct groups: Group I (N=96) was made up of two fee paying primary schools, Group II (N=181) comprises six non fee paying primary schools.

The learning style instruments for the study were made up of Hudson's Uses and Elaboration test (1966) Kagan Matching Familiar Figures Test (MFFT) (1965) and the Embedded Figures Test (EFT) (Witkins, 1965). Eysenck's JEPI (1965) and Hudson's Personal Qualities Questionnaire (1966) were adapted for measurements of personality traits. For the purpose of ensuring reliability of the instruments, the split-half. reliability coefficient using Spearman attenuation formula and item Analyses Methods were used for calculating the reliability coefficients of the instruments used for the study.

CHAPTER IV

ANALYSIS OF DATA AND RESULTS

The proposed methods for treatment of data matrix of the study have been highlighted in Chapter III. In the present chapter, the results of the main study and the statistical analyses are presented. Each result is preceded by the null hypothesis which it was testing. A significant level of 0.05 was adopted as the basis for rejection or non-rejection of the hypotheses. The main findings are discussed in chapter five.

Hypothesis 1

There is no significant difference in the primary school attainments between the:

a) Divergent and convergent children
b) Reflective and impulsive children
c) Field Independent and field dependent children.

For the purpose of resolving these hypotheses, there was the need to isolate the various styles for the purpose of analysis. Since the same tests were adopted for isoliting each of the styles for subsequent analyses:

Top Scorers Vs Bottom Scorers

For each of the learning style tests, the top 25% scorers and the bottom 25% scorers were isolated. The top scorers of Elaboration and Uses tests were the divergers and the bottom scorers were the convergers. Similarly, the top scorers of both Kagan C and KTG were the reflective children and the bottom scorers of these tests were the impulsive children. The top scorers of Witkin C and WTG were the field independent and the bottom scorers of these tests were the field dependent children. With this idea at the back of our mind we now see the significant differences through the use of the SPSS package ANOVA. The statistical application of this method for decision on whether to reject or refuse to reject hypotheses 1(a), 1(b) and 1(c) have been discussed in Chapter III.

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Hypothesis 1(a)

There is no gnificant difference in the primary school attainments between the divergent and convergent children.

a) When analysis of variance (Anova) was carried out to see if the boys of Group I differed significantly in Primary Science attainment scores, we notice that the divergers scored

significantly better than the convergers. The result is reproduced in Table 4.2.1 below.

Table 4.2.1

ANOVA: Divergence/Convergence (Uses) Primary Science Group I (Boys) N = 36

Source of Variation	SS of Sqs	df	Mean sq	F	P
Main Effects	256.898	1	256.898	6.444	<0.01
Explained	256.898	1	256.898		
Residual	1359.335	35	39.867		
Total	1652.233	36	45.895		

Table 4.2.2 below indicates that the girls in Group I who are divergers performed significantly better than the convergers of the same group in English Language attainment.

Table 4.2.2

ANOVA: Divergence/Convergence (Uses) English Group I (Girls) N = 30

Source of Variation	SS of sqs	df	Mean sqs	F	P
Main Effects	124.667	1	124.667	3.871	<0.05
Explained	124.667	1	124.667		
Residual	954.015	29	32.207		
Total	1058.682	30	35.289		

Table 4.2.3

ANOVA: Divergence/Convergence (Elab) Mathematics
Group II (Boys) N = 51

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	549.347	1	549.347	6.052	<0.01
Explained	549.347	1	549.347		
Residual	4538.436	50	90.769		
Total	5087.783	51	99.760		

When the boys of Group II were isolated for analysis (ANOVA) a significant difference in Mathematics performance was recorded. Tables 4.2.3 and 4.2.4 indicate this very clearly.

Table 4.2.4

ANOVA: Divergence/Convergence (Elab) Primary
Science Group II (Boys) N = 51

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	900.813	1	900.813	9.002	<0.004
Explained	900.813	1	900.813		
Residual	5003.417	50	100.068		
Total	5904.230	51	115.769		

When a combination of the entire population of boys and girls of Group I was subjected to Anova analysis, the following results reproduced in Table 4.2.5 was significant at 0.01 level of confidence.

Table 4.2.5

ANOVA: Divergenee/Convergence (Uses) Primary Science Group I N = 67

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	346.080	1	346.080	7.858	<0.01
Explained	346.080	1	346.080		
Residual	2906.589	66	44.039		
Total	3252.669	67	48.547		

Table 4.2.6 and 4.2.7 below indicates that the divergent children of Group II perform better than the convergent individuals in Mathematics and Primary Science.

Table 4.2.6

ANOVA: Divergence/Convergence (ELab) (Mathematics) Group II =N = 103

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	739.421	1	739.421	8.129	<01
Explained	739.421	1	739.421		
Residual	9277.893	102	90.960		
Total	10017.314	103	97.225		

Table 4.2.7

ANOVA: Divergence/Convergence (Elab) Primary Science Grop II N = 103

Scource of Variation					
Main Effects	409.363	1	409.363	3.980	/04
Explained	409.363	1	409.363		
Residual	10492.412	102	102.867		
Total	10901.775	103	105.842		

From the above findings Hypothesis 1(a) was rejected within the meaning of the above context. Table 4.2.1 to 4.2.7 were indications for rejections of Hypothesis 1(a) with significant differences recorded for boys, girls, and the entire population of Group I and Group II respectively. When the entire population for the research (N = 277) was utilized for analysis significant results were also recorded. The divergent children performed significantly better in Mathematics, English and Primary Science at 0.01, 0.05 and 0.01 level of confidence respectively. These are reflected in Tables 4.2.8, 4.2.9 and 4.2.10 below.

Table 4.2.8

ANOVA: Divergence/Convergence (Uses) (Mathematics)
Group I & II N = 149

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	574.721	1	574.721	5.563	<.01
Explained	574.721	1	574.721		
Residual	15290.510	148	103.314		
Total	15865.261	149	106.478		

Table 4.2.9

ANOVA: Divergence/Convergence (Uses) (English)
Group I & II N = 149

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	377.007	1	377.007	4.015	<.05
Explained	377.007	1	377.007		
Residual	13895.633	148	93.889		
Total	14272.640	149	95.790		

Table 4.2.10

ANOVA: Divergence/Convergence (Uses) (Primary Science)
Group I & II N = 149

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	513.476	1	513.476	5.536	<.01
Explained	513.476	1	513.476		
Residual	23727.230	148	92.752		
Total	14240.706	149	95.575		

The significant picture of the above analysis calls for rejection of Hypothesis 1(a) accordingly.

Hypothesis 1 (b)

There is no significant differences in the primary school attainment between the reflective and impulsive children. Since the means and standard deviation of test scores are insufficient to allow us to make decisions tabdive thypothesis 1(b) analysis of variance was chosen to test the means for decisions.

Table 4.2.11 below shows that the reflective boys in Group I performed significantly better ($p < 0.05$) than the impulsive children.

Table 4.2.11

ANOVA: Reflectivity and Impulsivity (KTG)
Primary Science Group I (Boys)
N = 29

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	205.634	1	205.234	4.267	<0.05
Explained	205.634	1	205.634		
Residual	1349.398	28	48.198		
Total	1535.035	29	53.622		

On the basis of the above finding, Hypothesis 1(b) was rejected.

Table 4.2.12 below indicates that the Reflective children performed significantly better in Mathematics than Impulsive ones with respect to Group I girls.

Table 4.2.12

ANOVA: Reflectivity/Impulsivity (KTG) Mathematics
Group I (Girls) N = 21

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	475.760	1	475.760	4.327	<0.05
Explained	475.760	1	475.760		
Residual	2198.963	20	109.948		
Total	2674.724	21	127.368		

On the basis of this finding, Hypothesis 1 (b) was rejected.

In Table 4.2.13 the reflective boys of Group II performed significantly better in Social Studies than the implusives.

Table 4.2.13

ANOVA: Reflectivity/Impulsivity (Kagan C) (Social Studies) Group II (Boys) N=49

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	921.986	1	921.988	6.227	<0.01
Explained	921.986	1	921.988		
Residual	7106.805	48	148.058		
Total	8028.192	49	153.853		

In Table 4.2.14 below the reflective boys of Group II performed significantly better in Social Studies than the implusive ones of the same group.

Table 4.2.14

ANOVA: Reflectivity/Impulsivity (KTG) Social Studies Group II (Boys) N = 73

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	1020.976	1	1020.976	6.930	<0.01
Explained	1020.976	1	1020.976		
Residual	10607.833	72	147.331		
Total	11628.810	73	159.299		

With the above recorded significant differences in performance in Social Studies (with the use of Kagan C and KTG) hypothesis 1(b) was rejected within the meaning of the above context.

Table 4.2.15

ANOVA: Reflectivity/Impulsivity (KTG) Primary Science Group I N = 51

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	394.256	1	394.256	6.606	<0.01
Explained	394.256	1	394.356		
Residual	2983.951	50	59.679		
Total	3378.208	51	66.239		

The reflective children performed significantly better in Primary Science, Mathematics and English than the impulsive ones as shown in Tables 4.2.15, 4.2.16 and 4.2.17.

Table 4.2.16

ANOVA: Reflectivity/Impulsivity (KTG) Mathematics
Group I (All) N = 51

Source of Variation	ss of sqs	df	Mean sq	F	P
Main Effects	937.861	1	937.861	7.806	<0.01
Explained	937.861	1	937.861		
Residual	6007.405	50	120.148		
Total	6945.265	51	136.182		

Table 4.2.17

ANOVA: Reflectivity/Impulsivity (KTG) English
Group I (All) N = 51

Sourceoof Variation	ss of sq	df	Mean sq	F	P
Main Effects	649.046	1	649.046	15.451	<001
Explained	649.046	1	649.046		
Residual	2100.294	50	42.006		
Total	2749.341	51	53.909		

Within the meaning of the above context Hypothesis 1 (b) was rejected.

Then reflective children of Group II performed significantly better than the impulsive children of group II in Social Studies as indicated below.

Table 4.2.18

ANOVA: Reflectivity/Impulsivity (KTG) (Social Science) Group II (All) N = 103

Source of Variation	SS of sqs	df	Mean of sq	F	P
Main Effects	957.020	1	957.020	5.700	<01
Explained	957.020	1	947.020		
Residual	21116.600	102	139.046		
Total	22053.700	103	145.090		

The reflective children of Group II performed significantly better than the impulsive ones in primary Science as reproduced in Tables 4.2.19 above and 4.2.20 below.

Table 4.2.20

ANOVA: Reflectivity/Impulsivity (KTG) Primary Science Group II (All) N=103

Source of Variation	ss of sqs	df	Mean sq	F	P
Main Effects	1119.543	1	1119.543	8.486	001
Explained	1119.543	1	1119.543		
Residual	13457.085	102	131.932		
Total	14576.628	103	141.521		

The above findings calls for rejection of Hypothesis 1(b).

Table 4.2.20 to 4.2.22 indicate that the reflective individuals in the entire population (N = 277) perform

significantly better than the impulsive ones.

Table 4.2.20

ANOVA: Reflectivity/Impulsivity (KTG) (English)
Group 1 & II N = 140

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	382.089	1	382.089	4.071	<.04
Explained	382.089	1	382.089		
Residual	21494.143	139	93.861		
Total	21876.232	140	95.114		

Table 4.2.21

ANOVA: Reflectivity/Impulsivity (KTG) (Social Studies) Group I & II N = 140

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	879.998	1	879.998	7.967	<.01
Explained	481.312	1	481.312		
Residual	24909.706	139	108.776		
Total	25391.018	140	110.396		

With the above findings hypothesis 1(b) was rejected within the meaning of the above context.

In Table 4.2.23 and 4.2.24 below the reflectives were seen to have performed significantly better than in Social Studies and Primary Science than the impulsive members of the group.

Table 4.2.23

ANOVA: Reflectivity/Impulsivity (Kagan C)
(Social Studies) Group I & II
N = 140

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	893.637	1	893.637	8.278	<.005
Explained	893.637	1	893.637		
Residual	16625.557	139	107.958		
Total	17519.194	140	113.027		

Table 4.2.24

ANOVA: Reflectivity/Impulsivity (Kagan C)
(Primary Science) Group I & II
N = 140

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	865.373	1	865.373	8.165	<.005
Explained	865.373	1	865.373		
Residual	16321.988	139	105.987		
Total	17187.362	140	110.886		

The findings above calls for rejection of Hypothesis 1 (b) within the meaning of the above context.

Hypothesis 1(C)

There is no significant difference in the primary school attainments between the field independent and field dependent children.

The following are the results of computations of the top 25% (field independent) and lower 25% (field dependent) children.

Table 4.2.25 indicate the significant difference ($P < 0.01$) in Primary Science performance between field independent and the field dependent boys of Group I.

Table 4.2.25

ANOVA: Field Independent/Dependent (WTG)
Primary Science Group I (Boys) N=22

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	337.779	1	337.779	6.939	<0.01
Explained	337.779	1	337.779		
Residual	1022.278	21	48.680		
Total	1360.057	22	61.821		

The field independent girls in Group I performed significantly better in Mathematics and English Language than the field dependent girls as indicated in Tables 4.2.26 and 4.2.27.

Table 4.2.26

ANOVA: Field Independent/Dependent (WTG)
Mathematics Group I (Girls) N=20

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	359.629	1	359.529	4.239	<0.05
Explained	359.629	1	359.529		
Residual	1560.224	19	82.117		
Total	1919.852	20	95.993		

Table 4.2.27

ANOVA: Field Independent/Dependent (WTG)
English Group I (Girls) N = 20.

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	226.339	1	226.339	9.139	<0.01
Explained	226.339	1	226.339		
Residual	470.564	19	24.767		
Total	696.903	20	34.845		

On the basis of the above significant findings hypothesis 1(c) was rejected within the meaning of the above context.

The field independent boys of Group II performed significantly better than the field dependent ones in English and Mathematics as shown in Table 4.2.28 and 4.2.29 below.

ANOVA: Field Independent/Dependent (WTG)
English Group II (Boys) N = 21

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	654.759	1	654.759	6.760	<0.01
Explained	654.759	1	654.759		
Residual	1937.144	20	96.957		
Total	2591.904	21	123.424		

Table 4.2.29

ANOVA: Field Independent/Dependent (WTG)
(Mathematics) Group II (Boys) N=53

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	589.929	1	389.929	4.250	<04
Explained	589.929	1	389.929		
Residual	7218.030	52	138.808		
Total	7807.59	53	147.320		

On the basis of the above significant results (Table 4.2.28 and 4.2.29) we notice that the boys of Group II who were field independent performed significantly better than their counterparts in school attainment. These significant findings compelled the investigator to reject Hypothesis 1(c) accordingly.

In table 4.2.30 the field independent girls of Group II performed significantly better in English Language than the Field Dependent ones. From this finding, Hypothesis 1(c) was rejected.

Table 4.2.30

ANOVA: Field Independent/Dependent Witkin C)(English) Group II (Girls) N = 23

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	885.867	1	885.867	9.299	<.001
Explained	885.867	1	885.867		
Residual	2095.895	22	95.268		
Total	2981.960	23	129.642		

In Table 4.2.31 the field independent children in Group II performed significantly better in Social Studies than the field dependent ones as indicated below:

Table 4.2.31

ANOVA: Field Independent/Dependent (WTG) (Social Studies) Group II (All) N = 103

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	635.072	1	635.072	5.069	<.02
Explained	635.072	1	635.072		
Residual	12778.426	102	125.277		
Total	13413.103	103	130.226		

It is clear from the significant picture of the above Table that the children of Group II who are field independent performed significantly better than their field dependent counterparts in school attainment.

On the basis of these significant results, Hypothesis 1(c) was rejected.

When the entire population sample of the two groups was subjected to Anova analysis in terms of school performance and learning styles the following significant results were discovered. Tables 4.2.32 to 4.2.35 indicated that the field independent children performed significantly better in Mathematics, English, Social Studies and Primary Science than the field independent children.

Table 4.2.32

ANOVA: Field Independent/Field Dependence (WTG) (Mathematics) Group I & II N = 147

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	610.916	1	610.916	5.761	.01
Explained	610.916	1	610.916		
Residual	15481.146	146	106.035		
Total	16092.062	147	109.470		

Table 4.2.33

ANOVA: Field Independent/Field Dependent (WTG) (English) Group I & II N = 147

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	925.528	1	925.528		<.01
Explained	925.528	1	925.528		
Residual	12271.900	146	84.054		
Total	13197.428	147	89.778		

Table 4.2.34

ANOVA: Field Independent/Field Dependent (WTG) (Social Studies) Group I & II N = 147

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	560.560	1	560.560	5.468	<.01
Explained	560.560	1	560.560		
Residual	14966.750	146	102.512		
Total	15527.310	147	105.628		

Table 4.2.35

ANOVA: Field Independent/Field Dependent (WTG) (Primary Science) Group I & II N = 147

Source of Variation	SS of sqs	df	Mean sq	F	P
Main Effects	505.318	1	505.318	5.442	<.02
Explained	505.318	1	505.318		
Residual	14966.750	146	102.572		
Total	15527.310	147	105.628		

The significant results of the above tables show conclusively the difference existing in the learning styles and attainment of:

a) Field Independent and Field Dependent children

b) Divergent and convergent children

c) Reflective and Impulsive children.

These significant results compelled the investigator to reject hypotheses 1a, 1b, and 1c, within the meaning of the above context

CORRELATION

The inter correlation of the variables were done using the SPSS package of Iya Abubakar Computer Centre. Inter correlations were deemed necessary in order to see the relationship between the variables used for the study as the partial correlation proposed for disposal of hypotheses 2 and 3 aspect of the hypotheses requires an output of correlation matrices. The correlations of the boys in Group I schools are reproduced in Table 4.3.1 below.

The table indicates that the extraversion test correlated with Elab test negatively at 0.05 level of confidence. The Uses test correlated positively with NVRT and English test at 0.001 level of confidence and with Lie negatively.

KTG scores correlated positively with WTG scores at 0.001 level of confidence. WTG scores on the other hand correlated positively with English score at 0.05 level of confidence and negatively with the Lie at 0.05 level of confidence. WTG also correlated positively with Primary Science at 0.05 level of confidence.

The extraversion scores correlated negatively with the English Language scores at 0.01 level of confidence and Lie correlated negatively with Rigidity scores at 0.05 level of confidence. The NVRT scores correlated positively with Witkin C and

English Language (P < 0.001) with Primary Science, Mathematics and Lie positively at 0.01 level of confidence but negatively with Kagan C (P < 0.01). NVRT also correlated with Authoritatianism positively at 0.05 level of confidence. The Uses test correlated positively with English Language and NVRT (P < 0.001); it also correlated with Primary Science (P < 0.01) positively but negatively with Lie at 0.01 level of confidence. Finally, NVRT correlated positively with Fee at 0.05 level of confidence.

The Defence scores correlated positively with the rigidity and Fee scores positively at 0.001 level of confidence. The Social Conformity scores correlated positively with rigidity and Fee at 0.05 level of confidence. Rigidity scores correlated negatively with Mathematics scores at 0.05 level of confidence and with Fee at 0.001 level of confidence. Mathematics scores correlated positively at 0.001 level of confidence with both English, Primary Science and Kagan C and with Social studies at 0.05 level of confidence.

The above is the summary picture of the correlations of the boys in Group I schools. We see a lot of significant correlations between personality variables the learning styles variables and school attainment scores. Remarks will be made on this data in the discussion of these results in chapter five.

CORRELATION MATRIX GROUP 1 (BOYS)

N = 51

1. ELAB																		
2. USES	1898																	
3. K.T. - G	0004	0069																
4. W.T. - G	0403	1136	5121															
5. N V R T	1829	5424	-1025	0352														
6. NEU	-1802	1663	1452	-0301	-0260													
7. EXTRA	-2498	-0256	-0973	-1929	-1638	4191												
8. LIE	-0168	-3384	0488	-1992	2992	6790	-0057											
9. DEFENCE	0051	-268	-0930	-1263	0643	0533	-0258	0632										
10. AUTH	0954	-0267	1863	11718	2352	1309	0326	0157	0538									
11. SOCON	1811	-0938	-0342	0954	-1631	0630	0161	-1024	1850	5130								
12. RIGID	-0354	0088	-0475	1914	-0330	1774	2179	-2286	4784	1381	2676							
13. FEE	0876	2038	0391	-0619	0410	0796	0710	-1249	3195	0445	2616	4883						
14. MATHS.	0765	1356	1715	-0456	3298	-1655	-4880	-0459	-0449	0191	1009	2410	-0592					
15. ENG	1992	4201	2121	2609	6045	-0735	-3451	-0828	-0327	-0359	-0819	-1784	-1311	4134				
16. S.STUDIES	1015	0290	-1037	-0768	1263	-1407	-0250	0033	-0539	-0498	-1146	-1962	-2573	2130	4361			
17. P.SCIENCE	1639	3693	1772	1987	3595	-1056	-0852	-1750	-1002	0289	1747	-1905	-1478	4517	4789			
18. KAGAN C	0442	-2036	0912	-0422	0830	-0580	566	1399	0341	-1071	-1240	-0095	0762	3569	2526	2854		
19. WITKIN C	-0647	1718	-1976	-0963	4308	-1266	-0172	-1421	0488	-0414	0425	-0778	1245	2036	1901	0832	-0898	-024
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Significance Levels

*** P<0.001

** P<0.01

* P<0.05

df = 51-2 = 49, for a two-tailed test.

ii) In the intercorrelations of the variables of the girls in Group I as reproduced in Table 4.3.2, We noticed that the Elaboration test correlated positively with NVRT test at 0.001 level of confidence. The Uses test correlated positively with NVRT Mathematics, English and Social Studies scores at 0.01 level of confidence and with Primary Science positively ($P < 0.001$). However, the Uses test correlated negatively with Neuroticism at 0.05 level of confidence.

The KTG scores correlated negatively with the Lie and Rigidity scores and positively with Mathematics scores at : 0.05 level of confidence.

WTG scores correlated positively and significantly with Social Studies ($P < 0.001$) and also with Mathematics and English ($P < 0.05$) but with Witkin C positively at 0.05 level of confidence.

The NVRT scores revealed significant negative correlations with both Neuroticism and Lie at 0.05 level of confidence. The Neuroticism scores reveal significant negative correlation with Rigidity at 0.001 level of confidence. The Lie score revealed significant negative correlations with Mathematics and English ($p < 0.01$) and also negative correlation with Primary Science ($P < 0.05$) but positive correlation with Social Conformity and Witkin C ($P < 0.05$). The Defence score correlated significantly with the Fee score ($P < 0.05$).

CORRELATION MATRIX (PRIVATE SCHOOLS)

1.	ELAB																	
2.	USES	0090																
3.	K.T. - G	-0965	-0099															
4.	W.T. - G	-0013	-0971	0586														
5.	N V R T	5433***	4200**	0301	1219													
6.	NEU	-0207	-2391*	-0664	16017	-2903*												
7.	EXTRA	0049	-0825	2193*	0411	-1626	1541											
8.	LIE	-1302	-2176	-3404*	-0937	-3066*	-1805	0231										
9.	DEFENCE	-1193	-0129	0687	-1920	-0703	1506	0281	0039									
10.	AUTH	0867	0811	0341	-2149	1447	-1543	-1543	-0247	-0434								
11.	SOCON	-0857	-0758	0635	-0061	-0623	-0616	-1377	2474*	-1683	1467							
12.	RIGID	0242	0864	-2475*	-1224	-1873	-6172***	-0710	1128	212	-1445	-1276						
13.	FEE	0426	1655	-0678	-0862	2195	0793	0272	0283	2463*	-0552	0966	3005*					
14.	MATHS	-1160	3698**	3594*	3265*	2167	-0293	-0897	-3387**	0445	2427*	1916	1020	1020				
15.	ENG	1191	3741**	1882	3167*	2140	0011	-0607	-3384**	0122	-8123	-0448	0995	5523***	5523***			
16.	S.STUDIES	0771	3578**	-0471	7289***	2137	-0076	-1563	-1849	-0905	1801	0329	1527	5387***	5387***	4292**		
17.	P. SCIENCE	-0436	5526***	1043	0576	1205	-0983	-1509	-2384*	1424	0721	0876	1296	5463***	5463***	5775***	5825***	
18.	KAGAN C.	1961	-0841	-1341	-1894	1497	-0175	0099	0874	-0192	-0931	0175	2237	-1930	-1930	-1279	0705	-1654
19.	WITKIN C.	-0616	1106	-0840	2486*	0849	-0070	-0964	2607*	-1470	-0324	2078	-0023	1677	1677	-0300	1483	0222	-0016
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Significance Levels

*** $P \leq 0.001$,
** $P \leq 0.01$,
* $P \leq 0.05$,
df = 46-2 =44,
for a two-tailed test.

921

The Authoritatianism score correlated significantly with Mathematics score ($P<0.05$). Rigidity correlated positively with Fee ($P<0.05$). The fee scores revealed significant positive intercorrelations with English, Social Studies and Primary Science all at 0.001 level of confidence. The Mathematics score correlated positively with English, Social Studies and Primary Science ($P<0.001$). The English scores correlated significantly and positively with Primary Science ($P<0.001$) and with Social Studies at ($P<0.01$). The Social studies score correlated significantly with Primary Science at 0.001 level of confidence.

The above is the summary picture of the correlation of the girls in Group I schools. We see a lot of significant correlations between personality variables the learning style variables and school attainment scores. Remarks will be made on this data in the discussion of these children in chapter five.

iii) Table 4.3.3 as reproduced below shows the intercorrelations of the data-matrix of the boys and girls of Group I schools. We notice that the Elaboration scores (Divergence) correlated positively with the NVRT scores at 0.001 level of c confidence.

The KTG scores correlated negatively with Fee at 0.01 level of confidence and positively with

WTG and Primary Science scores at 0.01 and 0.05 levels of confidence respectively. KTG scores further correlated positively with and Mathematics at ($P < 0.001$) and English and Social Studies score positively at 0.05 level of confidence. The WTG scores correlated positively with English scores at 0.01 level of confidence and negatively with Rigidity at 0.05 level of confidence. The NVRT scores correlated with Mathematics and English positively at 0.001 level of significance and with Social Studies, Primary Science and Witkin C scores at 0.05 level of confidence but negatively at 0.001 level of confidence with Lie scores.

The Extraversion scores revealed a negative correlation at 0.05 level of confidence with English scores, while the Lie scores showed a negative correlation at 0.05 level of confidence with both English and Primary Science scores. The Defence scores inter-correlated positively with both Rigidity and Authoritarianism ($P < 0.001$) and with Fee scores negatively at 0.001 level of confidence. The Authoritarianism score correlated positively with Social Conformity ($P < 0.01$), while Social Conformity score correlated positively with Regidity ($P < 0.05$).

Finally, the Uses test (Divergence) correlated positively with NVRT, English and Primary Science and Authoritarianism at 0.001 level of confidence.

TABLE 4.3.3

CORRELATION MATRIX (ALL)
GROUP I (ALL) N = 96

1.	ELAB																	
2.	USES	050																
3.	K.T. - G	0364	0036															
4.	N.T. - G	084	0217	3475 xx														
5.	N V R T	3725 xxx	4787 xxx	-0237	-0259													
6.	NEU	0015	-0498	-0811	0467	- 432												
7.	EXTRA	0367	-0505	0357	-1031	-1629	2835 xx											
8.	LIE	-0826	-0698	-1136	0996	-3015 xxx	-1140	0052										
9.	DEFENCE	-0634	-0994	-0963	-1136	0152	-0448	0000	0251									
10.	AUTH	-1177	67793	7855 x	0130	-0500	0124	-0626	-0025	6099 xxx								
11.	SOCON	1277	-0612	0157	0535	-0976	-0152	-0706	0730	0358	2708 xx							
12.	RIGID	-1398	0319	-0986	-1776 x	-1009	-0760	0803	-0771	3018 xxx	-0049	0042						
13.	FEE	-0050	0305	-2677 xx	-0564	1223	0479	0514	-0636	-3037 xxx	-0676	1699 x	3703 xxx					
14.	MATHS	-0319	-0582	3378 xxx	0787	2838 xx	-0995	-0660	-1595	-0314	1232	-1479	-2494 xx	01694				
15.	ENG	-1121	3912 xxx	1829 x	2754 xx	4552 xxx	-0317	-2298 x	-1771 x	-0181	-0219	-0673	-0949	-0356	4628 xxx			
16.	S.STUDIES	-0251	0476	1803 x	-0432	1615 x	-1087	-0860	-0637	-1013	0642	0446	-0379	-0794	4628 xxx	4276 xxx		
17.	P. SCIENCE	-0349	4611 xxx	1238 x	1423	2354 x	-1001	-1163	-2049 x	0372	0528	-1298	-1256	-0114	3405 xxx	4276 xxx	4135 xxx	
18.	KAGAN C	-1765	1424	0363	-0996	-0181	-0895	-1483	1199	-0089	0990	0519	-0421	+1322	4909 xxx	3057 xxx	4135 xxx	0166
19.	WITKIN C	-0169	-0770	0487	0537	2647 x	-0603	-0528	0233	-1097	-0361	1637 x	-0854	+0784	-2929 x	-2225 xx	-2132 x	-2166 xx	-0616
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Significance Levels
*** P< 0.001
** P< 0.01
* P< 0.05
df = 96-2 = 94,
for a two-tailed test.

TABLE 4.3.4
CORRELATION MATRIX (Public Schools) BOYS (N = 87)

1.	ELAB																	
2	USES	-0505																
3.	K.T. - G	-1080	-1371															
4.	W.T. - G	1378	-1327	4867***														
5.	N V R T	1477	0109	1323	0438													
6.	NEU	0395	-1702*	-0649	-2595**	1755*												
7.	EXTRA	1139	0669	-0972	-0237	0585	1033											
8.	LIE	0616	0067	-1051	-0727	0931	-2195*	-1560										
9.	DEFENCE	0643	1795*	-0288	0257	1976**	1531	-1057	0869									
10.	AUTH	1363	1963*	-0683	-0789	2937**	-1383	1470	0404	1412								
11.	SOCON	2582**	3037**	-2411*	-1065	0967	-0287	1967**	0385	2508**	3177**							
12.	RIGID	0804	1965*	0044	0048	0627	-0219	2769**	1428	0766	2250**	3405***						
13.	FEE	0014	3333***	-1305	-0833	0289	-0318	-0621	-0217	2773**	2235**	2242*	3156***					
14.	MATHS	2496**	0789	-0149	-0887	2210**	-0317	1380	-1121	-0035	3544***	-0305	0014	-0830				
15.	ENG	1651	0454	-0584	1476	0736	-0216	1296	-1684	-0321	2422**	0292	0297	-0400	4899***			
16.	S.STUDIES	2263*	-0111	1231	2807**	0076	-1036	2228**	-1158	-1011	1908*	-0317	-0193	-1681	-1094	5521***		
17.	P.SCIENCE	3676***	-0381	0523	1539	0598	0234	1479	0282	0394	1975*	0391	0038	-2029*	4041***	3580***	5163***	
18.	KAGAN C	0682	0196	-0825	0282	-0896	0936	-0586	1445	0502	-1187	1021	-0754	1744*	-4073	1564	1033	-0862
19.	WITKIN C	1249	-0196	1166	0841	1836*	-1417	-1789*	1417	0370	1677	0306	0071	0377	0492	-1819*	0581	0377	0342
			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Significance Levels
*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
df = 87-2 = 85,
for a two-tailed test.

120

The Rigidity scores correlated positively with Fee scores at 0.001 level of confidence but negatively with Mathematics scores at 0.01 level of confidence. The Mathematics scores correlated significantly and positively with Social Studies, English, Kagan C and Primary Science, all at 0.001 level of confidence. The Social Studies correlated with Kagan C and Primary Science ($P < 0.001$).

iv) The intercorrelations of the variables for the boys of Group II schools showed that the Elaboration test correlated significantly at 0.001 level with Primary Science, Mathematics and Social Conformity at 0.01 level of confidence. It also correlated positively with Social Studies at 0.05 level of confidence. The Uses test correlated significantly with Fee test at 0.001 level of confidence, with Social Conformity at 0.01 level of confidence and wigh Defence, Authoritarianism and Rigidity positively at 0.05 level of confidence. It correlated negatively with Neuroticism at 0.05 level of confidence.

KTG scores correlated positively with WTG scores at 0.001 level of confidence but negatively with Social Conformity ($P < 0.05$). The NVRT scores correlated positively with Neuroticism, Defence, Mathematics and Witkin C at 0.05 level of confidence and also positively with Authoritarianism scores at 0.01 level of confidence. The Neuroticism scores correlated negatively with the Lie scores at 0.05

level of confidence. The Extraversion scores correlated positively with Rigidity, Social Conformity and Social Studies scores ($P<0.01$) and also with Witkin C negatively ($P<0.05$). WTG correlated positively with Social Studies ($P<0.01$ and with Neuroticism negatively ($P<0.01$). The Defence scores correlated positively with Fee and Social conformity scores at 0.01 level of confidence.

The Authoritarianism scores correlated positively with Mathematics scores at ($P<0.001$), with Socon, Fee, and English scores at ($P<0.01$) and with Rigidity and Primary Science at 0.05 level of confidence. The Social Conformity scores correlated positively with Rigidity scores ($P<0.001$) and Fee scores at ($P<0.05$). Rigidity scores showed intercorrelation with Fee scores at 0.001 level of confidence. The Fee scores correlated negatively with Primary Science scores at 0.05 level of confidence but positively with Kagan C ($P<0.05$).

The Mathematics scores intercorrelated positively with English and Primary Science scores at 0.001 level of confidence, while the English scores correlated positively with Social Studies and Primary Science scores ($P<0.001$). The Social Studies intercorrelated positively with Primary Science ($P<0.001$). Comments on these will be made in Chapter five.

v) In the intercorrelation of the variables for girls of Group II, we noticed that Elaboration scores (Divergence) reveal significant positive correlations with NVRT ($P<0.01$) and with Mathematics ($P<0.05$). The Uses test revealed positive intercorrelation with NVRT ($P<0.05$) and negative correlation with the Lie scores ($P<0.01$). The KTG scores reveal positive intercorrelations with WTG scores (P 0.001).

The NVRT scores correlated positively and significantly with English scores ($P<0.001$), Rigidity and Witkin C ($P<0.01$) and with Authoritarianism ($P<0.05$). The Neuroticism scores correlated positively with Defence scores, ($P<0.05$) and negatively with English ($P<0.01$). The Defence scores correlated positively with Rigidity scores ($P<0.01$) and with Social Conformity ($P<0.05$) and Fee scores at 0.001 level of confidence. Extraversion correlated negatively with Mathematics ($P<0.001$) while Lie correlated with Authoritarianism (P 0.05). The Authoritarianism score showed positive intercorrelations with Fee, Rigidity and Social conformity scores ($P<0.001$).

The Socon scores correlated with Rigidity scores ($P<0.001$) and Fee scores ($P<0.01$). The Rigidity scores revealed positive intercorrelations with English at ($P<0.05$) and Witkin C ($P<0.01$). The Mathematics scores correlated significantly with English ($P<0.05$), Social Studies score ($P<0.001$)

1. ELAB																			
2. USES	0614																		
3. K.T. - G	-0311	1137																	
4. W.T. - G	0978	0134	3420																
5. NVRT	2465	2182	1864	-0147															
6. NEU	0876	0138	-0986	-1426	-3125														
7. EXTRA	-0429	-0237	-0024	-0357	0674	1200													
8. LIE	0829	-2511	0561	-1704	-0040	-0448	-0572												
9. DEFENCE	0210	0876	-1158	0177	0547	2256	1207	0327											
10. AUTH	0936	0137	218	1085	1724	-1603	6567	1810	1491										
11. SOCON	864	-0130	-0440	0146	1548	-1821	1707	0307	2083	4735									
12. RIGID	1787	1477	0911	0605	2308	0648	0657	-0993	2673	4913	4853								
13. FEE	0430	0683	-0428	0913	-2881	-0059	1608	1735	4827	3781	2945	-0138							
14. MATHS	1935	0213	0324	1020	1021	0760	-6795	2755	0043	0664	1245	-0138	-0139						
15. ENG	0133	1313	1705	0600	3365	-2553	1203	-0186	0155	0081	0827	1845	-0576	1865					
16. S.STUDIES	6323	-1243	1119	0797	0517	-1059	0269	-0455	-0555	0405	0606	0330	-0647	3590	3437				
17. P.SCIENCE	-0116	-0448	1170	0503	0678	-094	0678	-0109	-0203	0525	1325	0743	0009	2699	3288	6627			
18. KAGAN C	1226	-0243	1095	1738	0284	1473	-1705	-0324	1189	-1443	-0639	-0314	1011	0143	-0139	-1372	-0980		
19. WITKIN C	0949	-0270	1439	1561	2434	-1660	-1079	0900	1145	2364	0825	2142	0534	0714	3217	1552	1251	0929	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Significance Levels
*** P < 0.001
** P < 0.01
* P < 0.05

df = 94-2=92,
for a two-tailed test

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with Primary Science ($P<0.01$). The English scores intercorrelated positively with Social studies, Witkin C and Primary Science at 0.001 level of confidence while the Social Studies scores intercorrelated positively with Primary Science at 0.001 level of confidence.

From the above, we notice considerable intercorrelations between the learning styles variables, personality dimensions, and attainment scores, Comments will be made on these in chapter five.

vi) The intercorrelations of the variables for both boys and girls of Group II schools show that the Elaboration scores correlated significantly with NVRT, Mathematics and primary Science scores ($P<0.01$) and with WTG, Authoritarianism, Rigidity and Social Conformity ($P<0.05$). The Uses score correlated significantly and positively with Fee scores ($P<0.01$), NVRT and Rigidity scores at ($P<0.05$) and the Defence and Lie negatively ($P<0.05$).

The scores intercorrelated significatntly with WTG scores ($P<0.001$) and positively with Witkin C ($P<0.05$) but negatively with Neuroticism and Lie scores ($P<0.05$). The NVRT scores correlated positively with Authoriatrianism, Witkin C and English scores ($P<0.01$) and also positively with Rigidity and Mathematics scores ($P<0.05$).

The Neuroticism scores correlated positively with Defence scores ($P<0.01$) and negatively with Lie, Fee Authoritarianism, English scores and Witkin C all at 0.05 level of confidence. Extraversion correlated positively with Socon ($P<0.01$), and with Rigidity and English scores ($P<0.05$). The Defence scores correlated positively with Socon and Rigidity scores ($P<0.01$) and also positively with Authoritarianism at 0.05 level of confidence.

The Authoritarianism scores reveal significant positive correlations with Social Conformity, Rigidity. and Fee scores ($P<0.001$) and also positivitly with Mathematics ($P<0.01$) The Social Conformity scores reveal positive intercorrelations with Rigidity and Fee scores both at 0.001 level of confidence. Rigidity correlated with Fee ($P<0.01$).

The Mathematics score reveal positive intercorrelation with English, Social Studies and Primary Science scores all these are significant at 0.001 level of confidence. The English scores reveal positive significant correlation with Social Studies and Primary Science ($P<0.001$) and the Social Studies scores indicate positive intercorrelation with Primary Science ($P<0.001$). The findings from above which shows some patterns of intercorrelations between attainment variables,

TABLE 4.3.6
CORRELATION MATRIX (PUBLIC SCHOOLS) ALL (N = 181)

1.	ELAB																		
2.	USES	0154																	
3.	K.T. + G	-0245	0031																
4.	W.T. + G	1228	-0458	4050															
5.	N V R T	1852	1261	1344	-0305														
6.	NEU	0536	-0708	-0818	-1973	-0766													
7.	EXTRA	0426	0168	-0473	-0318	0475	1129												
8.	LIE	0898	-1358	-0187	-1249	0411	-1291	-1035											
9.	DEFENCE	0954	-1356	-0826	0305	0507	1807	0423	0284										
10.	AUTH	1385	1061	0222	0206	2331	-1498	1001	1137	1541									
11.	SOCON	1376	1040	-0690	-0337	1298	-1129	1801	0318	2166	3862								
12.	RIGID	1425	1707	0525	0418	1586	02431	1539	-1115	2124	3680	4279							
13.	FEE	0488	1863	0138	-0546	0624	-1685	-0318	0849	2392	3590	3090	3105						
14.	MATHS	2103	0448	-0178	0563	1569	0363	1049	-0950	1164	1783	0272	0272	-0466					
15.	ENG	0652	0835	0630	0942	2061	-1336	1215	-0956	-0385	1160	0630	1031	-0656	3296				
16.	S.STUDIES	1340	-0706	1179	1761	-0283	-1054	1294	-0827	-0840	1205	0200	0044	-1202	3823	4552			
17.	P. SCIENCE	1761	-0453	0879	0943	0585	-0350	1063	0041	-0441	1146	0985	0325	-1003	3325	3733	5807		
18.	Kagan C	0861	-0026	0888	-0701	0343	1177	-1072	0399	0802	-1094	-1039	0513	-0229	-0481	-0898	0921	-0907	
19.	WITKIN C	1253	-0196	1282	1230	2126	-1554	-1437	1179	0921	2042	0561	1248	0535	0589	0526	0352	0761	0169

Significant Levels
*** P<0.001
** P<0.01
* P<0.05

df = 181-2 = 179,
for a two-tailed test.

learning styles and personality will be discussed in chapter five.

vii) The intercorrelations of the variables for all children (N=277) show positive correlation for Elaboration (Divergence) test and NVRT at 0.001 level of confidence and with Authoritarianism at 0.01 level of confidence and with both English, Uses and Primary Science at ($P<0.05$) (Table 4.3.7).

The Uses test (Divergence) intercorrelated positively with NVRT, Authoritarianism, English, Primary Science at ($P<0.001$) and with Mathematics at ($P<0.01$) and also with Fee scores at ($P<0.05$) but negatively with Neuroticism scores ($P<0.05$) and Lie scores at ($P<0.001$).

KTG (Reflectivity) scores correlated significantly and positively with WTG scores ($P<0.001$) NVRT, English, Mathematics and Primary Science scores at ($P<0.05$) but negatively with Lie ($P<0.05$). The WTG (Field Indepedence) scores showed positive correlations with English ($P<0.01$) and also correlated positively with both Primary Science, Witkin C and Social Studies all at ($P<0.05$). The NVRT scores showed positive intercorrelations with Authoritarianism, Mathematics, Witkin C and English at ($P<0.001$) but negatively with Neuroticism and Lie ($P<0.01$).

The WTG showed positively intercorrelations with English ($P<0.01$) and also correlated positively with both Primary Science Witkin C and Social Studies

TABLE A.3.4

CORRELATION MATRIX (ALL)
N = 277

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	ELAB																			
2.	USES	1223																		
3.	K.T. - G	-0319	1312																	
4.	W.T. - G	0727	0783	2366																
5.	N V R T	3213	6236	1292	0544															
6.	NEU	-0156	-1306	-0435	-1220	-1626														
7.	EXTRA	0227	0898	0619	-0343	0605	1441													
8.	LIE	-0129	-2293	-1185	-0438	-1729	-1058	-0793												
9.	DEFENCE	0125	0935	-1143	-0107	0859	0850	0435	0156											
10.	AUTH	1498	3203	1146	0669	3355	1506	1215	0223	1515										
11.	SOCON	0575	0724	0029	0016	0659	-0945	1253	6370	1592	3557									
12.	RIGID	0820	0524	-0583	-0323	0144	0444	1280	-0139	2349	2474	3157								
13.	FEE	0387	1283	-0091	-0540	0734	-0812	-0057	0241	2614	2476	3662	3273							
14.	MATHS	0877	1468	1383	0715	2030	-0181	0648	-0250	0717	1735	0650	-0246	-0249						
15.	ENG	1001	2694	1304	1614	3327	-1302	0726	1331	-0115	1648	0503	-0503	-0545	3634					
16.	S.STUDIES	0855	0040	0159	1323	0342	-0908	6795	-0691	-0882	0891	0052	-0034	-1076	3628	4345				
17.	P. SCIENCE	1028	2098	1076	1213	1760	-0694	0745	-0748	-0070	1506	1134	-0055	-0676	3750	4153	5393			
18.	KAGAN C	0963	-0728	0579	-0830	-0442	0585	0224	0707	0477	0274	-1080	-0476	0237	0209	0242	0752	0239		
19.	WITKIN C	0625	1951	0290	1251	3142	1503	-0790	0522	0493	3201	0975	0573	0607	1108	1055	0320	0830	0166	

Significant Levels
***, $p < 0.001$
** $p < 0.01$
* $p < 0.05$

df = 277-2 =275,
for a two-tailed test.

($P < 0.05$)

The Neuroticism scores showed positive correlations with Authoritarianism ($P < 0.05$) and Extraversion and Witkin C ($P < 0.01$) but negative correlations with English scores at 0.05 level of confidence. But the Extraversion scores showed positive intercorrelation with Authoritarianism, Socon and Rigidity scores ($P < 0.05$) and with Social Studies ($P < 0.001$). The Lie score correlated positively with Socon ($P < 0.001$) and English ($P < 0.05$) but negatively with Mathematics score at 0.05 level of confidence.

The Defence scores correlated positively with Rigidity and Fee scores ($P < 0.001$) and also positively with Authoritarianism and Social Conformity both at 0.01 level of confidence. The Authoritarianism score correlated significantly and positively with Social Conformity, Rigidity and Fee scores ($P < 0.001$) and also positively with Mathematics, English and Primary Science at ($P < 0.01$).

The Socon scores correlated significantly and positively with Rigidity and Fee scores at 0.001 level of confidence. Rigidity correlated with Fee ($P < 0.001$). The Mathematics score reveal significant

intercorrelation with English, Social Studies and Primary Science ($P < 0.001$).

English scores showed positive intercorrelations with both Social Studies and Primary Science ($P < 0.001$). Social Studies correlated with Primary Science ($P < 0.001$).

The similarity in the nature of correlations between personality, learning styles and attainment as revealed in correlation Matrix 4.3.7 indicate a familiar picture to the investigator on which comments will be made in chapter five.

Hypothesis 2

There is no significant relations in the attainment scores and learning styles of pupils in primary schools when the effect of the Non Verbal Reasoning Test(NVRT) is partialled out.

The need to put hypothesis 2 to test for subsequent acceptance or rejection led the investigator to calculate the partial correlations of learning styles and attainment scores while the effect of NVRT was partialled out. The correlation coefficients of the variables were used as data for the computation. The results of this hypothesis should be far reaching in the overall goal of this study. Observation of the correlation matrices indicated that the Non Verbal Reasoning Test (NVRT) was an important factor in primary school attainment. Equally true as indicated in the matrices were the learning styles.

The objective of hypothesis 2 was to enable us locate the relative importance of each particularly the relative importance of learning styles in attainment. Ferguson (1966) recommended the use of partial correlation for attaining this objective. It enables us to locate the actual relationship between learning styles and attainment while we control for a third equally but relatively important variable - the NVRT.

The following formula was used to obtain the partial coefficient, that is, the residual effect when the effect of the third variable, the NVRT was partialled out.

$$r_{12.3} = \frac{r_{12} - r_{13}\, r_{23}}{(1 - r_{12.3}^2)\ (1-r_{23}^2)}$$ where

$r_{12.3}$ = The Correlation between residuals (learning style and attainment) When the effect of the third variable (NVRT) has been removed.

Finally, a T-test was used to test whether the calculated partial correlation was significantly different from zero. This was calculated with the use of the following formula:

$$t = \frac{r_{12.3}}{(1-r_{12.3}^2)/N-3}$$ where

$r_{12.3}$ = the partial correlation between a learning style and attainment with the third variable the NVRT controlled.

N = Number of subjects

This value was referred to a table of t with N = 3 degree of freedom.

Table 4.4.1 and 4.4.2 indicate the significant relationship between Divergence and Mathematics for Group I girls ($P < 0.05$) and for Group II boys ($P < 0.05$)

when the effect of NVRT was partialled out in each case. A third significant relationship was revealed between Mathematics and Divergence when the population sample of the entire Group II children was used for computation. (Table 4.4.3). The relationship was significant at 0.01 level of confidence. With these significant results hypothesis 2 was rejected within the meaning of the above context. In other words, as far as the relationship between Mathematics and Divergence is concerned, hypothesis 2 was rejected.

Girls
(Group I) Table 4.4.1

Partial Corr. Mathematics/Divergence
(Elab) NVRT Out.

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	d df (N-3)	p
Maths Uses	Maths NVRT	Uses NVRT	Uses Uses NVRT	NVRT	2.238	39	<0.05
(0.3898)	(.2167)	().4200)	(0.3374)				

Table 4.4.2 indicate the inconsequential effect of NVRT in the correlation between Mathematics and Divergence learning style ($P<0.02$).

Boys(Group II) Table 4.4.2

Partial Corr.(Mathematics/Divergence) (Elab)

r_{12} Maths	r_{13} Maths	r_{23}	$r_{12.3}$ Maths	Part out	t	df (N-3)	p
Elab	NVRT	Elab	Elab	NVRT	2.0894	81	0.05
(0.2498)	(0.2210)	NVRT	NVRT		2.0894	81	<0.05
		(0.1477)	(0.2251)				

The enrite population sample of group II schools Table 4.4.3) also showed significant relationship between Mathematics and the learning style of divergence (P 0.01).

Table 4.4.3

Boys & Girls (Group II) Partial Corr.(Mathematics/Divergence NVRT out) (Elab)

r_{12} Maths	r_{13} Maths	r_{23}	$r_{12.3}$ Maths	Part out	t	df (N-3)	p
Elab	NVRT	NVRT	Elab	NVRT	2.5930	175	<0.01
(0.2103)	(0.1569)	(0.1852)	NVRT				
			(0.1924)				

Similar results as the above surfaced when the effect of NVRT was partialled out of the relationship between Divergent learning style and Primary Science.

Table 4.4.1 indicates the fact that NVRT has no significant effect on the correlations between Primary science and Elaboration test (Divergence) since this relationship remained positively significant ($P < 0.05$) when the effect of NVRT was partialled out of the relationship

Table 4.4.4

Boys/girls
(Group II)

Partial Corr. (Primary Science/Divergence NVRT out)(Elab)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
PS Elab	PS NVRT	Elab NVRT	PS Elab	NVRT	2.315	175	<0.05
(0.1761)	(0.0585)	(0.1852)	NVRT (0.1618)				

The above significant results which utilized the population sample of Group II schools is also true for Group I schools (Table 4.4.5) ($P < 0.001$).

Table 4.4.5

Boys/Girls
(Group I)

Partial Corr. Primary Science/Divergence (Uses)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	p
PS Uses	PS NVRT	Uses NVRT	PS Uses	NVRT	4.3181	93	<0.001
(0.4611)	(0.2351)	(0.4787)	(0.4085)				

Table 4.4.6 below also indicates the significant relationship between Primary Science and the learning style of Divergence at 0.001 level of confidence when the effect of NVRT was partialled out. This was with respect to the boys in Group II schools.

The totality of the above results in respect with the relationship between Divergence and Primary Science and Mathematics attainments when the effect of NVRT was partialled out calls for rejection of hypothesis 2 within the meaning of the above context.

Table 4.4.6

Boys (Group II)

Partial Corr. (Primary Science/Divergence (Elab) NVRT out)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
PS Elab (0.3676)	PS NVRT (0.0598)	Elab NVRT (0.1477)	PS Elab NVRT (0.3634)	NVRT	3.3801	81	<0.

Tables 4.4.7 and 4.4.8 below shows the significant relationship between the learning style of Divergence and English language on one hand and between divergence and attainment in Social Studies on the other hand when the effect of the Non Verbal Reasoning Test was partialled out in each case. Each of the relationships was significant at 0.05 level of significance with different sample population.

Within the meaning of the above context, hypothesis 2 was rejected.

Table 4.4.7

Boys/Girls
(Group I)

Partial Corr. (English/Divergence (Elab)
NVRT out)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	(df_{N-3})	P
Engl Uses (0.3912)	Engl NVRT (0.4557)	Uses NVRT (0.4787)	Engl Uses NVRT (0.2214)	NVRT	2.192	93	$< 0.$

Table 4.4.8

Boys (Group II)

Partial Corr. (Social Studies/Divergence (Elab)
NVRT out)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	(df_{N-3})	P
SS Elab (0.2263)	SS NVRT (0.0076)	Elab NVRT (0.1477)	SS Elab NVRT (0.2278)	NVRT	2.1044	81	$< 0.$

In Table 4.4.9, the relationship between Social Studies scores and WTG scores (Field Independence) was sustained ($P < 0.01$) after the effect of NVRT was partialled out.

Table 4.4.9

Girls (Group II)

Partial Corr. (Social Studies/Field Independence (WTG)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
SS WTG	SS NVRT	WTG NVRT	SS WTG NVRT	NVRT	2.6360	81	<0.01
(0.2807)	(0.0076)	(0.0438)	0.2810				

The above significant results calls for rejection of hypothesis 2.

Table 4.4.10 shows that the NVRT test has no significant effect in the relationships between Primary Science scores and Elaboration test (Divergence) ($P < 0.001$).

Table 4.4.10

(Group I and II)

Apartial Corr. Social Studies/Field Independence (WTG) NVRT out)

r_{12}	r_{13}	r23	$r_{12.3}$	Part out	t	df (n-3)	P
SS WTG	SS NVRT	WTG NVRT	SS WTG	NVRT	2.1803	274	<0.05
(0.1323)	(0.0342)	(0544)	(0.1306)				

The findings above clearly indicated the positive significant relationship of the learning style of field Independence with attainment in Social Studies. Within

the meaning of the above context hypothesis 2 was rejected.

The relationship between English Language attainment and Field Independence is given below.

Table 4.4.11

Boys/Girls
(Group I)

Partial Corr. (English/Field Independence(WTG) NVRT out)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
Engl WTG	Engl NVRT	WTG NVRT	Engl WTG	NVRT	3.006	93	<0.001
(0.2754)	(0.4557)	(0.0239)	(0.2972)				

When NVRT was partialled out of the relationship between English Language scores and the Uses score (Divergence) the relationship remained significant at 0.001.

Table 4.4.12

(Group I & II)

Partial Corr. (English/Field Independence(WGT) NVRT Out)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
Engl WTG	Engl NVRT	WTG NVRT	Engl WTG NVRT	NVRT	2.404	274	<0.02
(0.1614)	(0.3327)	(0.0544)	(0.1616)				

On the basis of these significant findings hypothesis 2 was rejected.

The relationship between Mathematics and WTG (Field Independence) remained significant ($P < 0.02$) when the effect of NVRT was partialled out as indicated in Table 4.4.13 below:

Table 4.4.13

Girls
(Group I)

Partial Corr. (Mathematics/Field Independence (WTG) NVRT out)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
Maths WTG	Maths NVRT	WTG NVRT	Maths WTG	NVRT	1.946	39	< 0.02
(0.3265)	(0.2167)	(0.1319)	(NVRT (0.3079)				

The above finding further validate the rejection of hypothesis 2.

Table 4.4.14 indicates that the correlation between Mathematics and Kagan C(Reflectivity) remain positively significant ($P < 0.02$) when the effect of NVRT was partialled out for Group I male children.

Table 4.4.14

Boys (Group I)

Partial Corr. (Mathematics/Reflectivity) (Kagan C) NVRT out)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
Maths Kagan C (0.3569)	Maths NVRT (0.3298)	Kagan C NVRT (0.1383)	Maths Kagan C NVRT (0.3328)	NVRT	2.5212	51	<0.02

When the effect of NVRT was partialled out in the correlation between Mathematics and the KTG test (Reflectivity) the correlations remained significant ($P<0.05$). When the boys and girls of Group I schools were taken together the following results emerged. Table 4.4.15 indicates the non significant effect of NVRT on the relationship between Mathematics and KTG (reflectivity) ($P<0.01$).

Table 4.4.15

Boys/Girls (Group I)

Partial Corr. Mathematics/Reflectivity -NVRT Out (KTG)

r_{12}	r_{13}	r_{23}	$1_{12,3}$	Part out	t	df (N-3)	P
Maths KTG (0.3778)	Maths NVRT (0.2838)	KTG NVRT (0.0240)	Maths KTG (0.3864)	NVRT	3.3834	93	<0.001

The results above which indicate the significant relationship of Mathematics attainment with reflective learning style provided the needed information which made hypothesis 2 to be rejected within the meaning of the above context.

Hypothesis 3

There is no significant relationship between selected personality traits and primary school attainments when the effect of the Non Verbal Reasoning Test is partialled out.

The same statistical method used for testing significant relationship for hypothesis 2 was applied here. From the correlation matrices (Tables 4.3.1 to 4.3.7) significant correlations between personality traits and attainment recorded were isolated. With each of these significant correlations, partial correlations in which the effect of the Non Verbal Reasoning test was partialled out was computed with the same formula applied to hypothesis 2. The t-test was applied to locate the degree of significance of findings.

The results of the only two significant relations at 0.05 and 0.01 level of confidence are presented below:

Table 4.5.1

Partial Correlation (N = 277)

English, Authoritarianism and NVRT

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part out	t	df (N-3)	P
Engl Auth	Engl Auth	Auth NVRT	Engl Auth NVRT	NVRT	2.0985	274	<0.05
0.1648	0.3355	0.3327	0.1257				

Table 4.5.1 above indicate significant relationship ($P < 0.05$) between attainment in English Language and the personality trait of authoritarianism when the effect on NVRT was partialled out.

A significant relationship ($P < 0.01$) was also recorded (Table 4.5.2) between attainment in Mathematics and the personality traits of authoritarianism when the effects of NVRT was partialled out.

Table 4.5.2

Partial Correlation

Mathematics, Authoritarianism and NVRT Out (N=274)

r_{12}	r_{13}	r_{23}	$r_{12.3}$	Part		df (n-3)	P
Maths Auth	Maths NVRT	Auth NVRT	Maths Auth	NVRT	3.0252	274	<0.01
0.1735	0.2030	0.3355	NVRT 0.1829				

Results above indicate that only the personality trait of authoritarianism has any direct relationship with school attainments of Mathematics and English Language. The relationship was not significant for Primary Science and Social Studies attainments. Bearing in mind that all the other six personality traits failed to reach significant level of relationship with attainment when the effect of NVRT was partialled out, hypothesis 3 was partially rejected. We should have refused to reject this hypthesis but for the significant result recorded for authoritarianism. Discussion on this finding will be made in Chapter five.

Hypothesis 4

There is no significant pattern in the factor analysis of the variables of learning styles and attainment scores so that the first factor would have these variables accounting for the largest comman variance.

This hypothesis makes it to work out the factor analyses of the variables of different groups of the study to ascertain if a definite pattern of relationships exists in the variables when the common independent (Orthogonal) factors are extracted. The variables used in the analyses were Elaboration, KTG, WTG, NVRT, Neuroticism, Extraversion, Lie, Defence, Authoritarianism, Social Conformity, Rigidity, Freedom of Emotional Expression, (Fee) Mathematics, English, Social Studies, Primary Science scores, Kagan C (reflectivity) Witkin C (Field Independence) and Uses (Divergence) scores.

a) In the factor analysis of the boys of Group I children, we notice four independent factors as reproduced in Table 4.6.1 below:

Table 4.6.1

Factor Matrix: Boys of Group I

Variables	Factor I	Factor II	Factor III	Factor IV	Community (H^2)
Elab	0.22	0.10	0.02	(0.34)	0.17
Uses	(0.46)	(0.45)	-0.07	-0.05	(0.42)
KTG	0.15	0.04	(0.61)	-0.02	(0.40)
WTG	0.25	-0.12	(0.48)	0.20	(0.35)
NVRT	(0.71)	(0.31)	(-0.42)	-0.04	(0.78)
Neuro.	-0.18	0.28	0.17	(0.37)	(0.27)
Extra.	(-031)	0.21	0.07	(0.65)	(0.57)
Lie	-0.16	(-0.37)	0.17	-0.11	0.20
Defence	-0.17	(0.35)	-0.13	0.20	0.21
Auth	(0.31)	0.23	(0.45)	0.15	(0.37)
Socon	-0.09	(0.43)	(0.31)	0.24	(0.34)
Rigid	(0.40)	(0.53)	-0.09	0.09	(0.46)
Fee	-0.22	(0.56)	-0.09	-0.22	(0.42)
Maths	(0.51)	0.079	0.10	-0.10	0.29
Engl.	(0.83)	0.08	0.05	-0.08	(0.70)
S.S	(0.39)	-0.17	-0.07	-0.06	0.16
P.S	(0.60)	0.11	0.24	-0.03	(0.43)
KC	-0.28	-0.27	(0.030)	(0.40)	(0.40)
WC	0.23	0.15	(-0.32)	-0.04	0.18
Eigen Value	2.97	1.90	1.46	1.10	
Or					
Latent Root Variance (%)	40.0%	25.5%	19.5%	14.8%	

Note: Factor loadings in brackets are significant.

From the above table, we notice that divergence (Uses) and NVRT, Introversion and the less rigid boys, Mathematics, English, Social studies and Primary Science appear as the first common factor and accounted for 40% of the total variance. The second independent factor had Uses, NVRT, Defence, Social Conformity, Rigidity and negative Lie scores as significant .

The third independent factor came out with KTG WTG, Authoritarianism and Social Conformity with negative loadings of NVRT, Kagan C and Witkin C. The fourth factor had positive loadings only on Elaboration and Kagan C scores but negative loadings on Neuroticism and Extraversion. We see also that Factor I of the Matrix had loadings on Divergence test (Uses) and negative loadings on Extraversion and Rigidity. Four significant loadings on Divergence, NVRT, introversion and the less rigid came out with the positive loadings of all attainment tests. On the basis of above findings, hypothesis 4 was rejected.

b) The factor analysis of Group I girls also indicated four independent factors with Factor I standing out distinctly, as indicated in Table 4.6.2 below.

Table 4.6.2

Factor Matrix: Group I Girls

Variables	Factor I	Factor II	Factor III	Factor IV	Communality (h^2)
Elab	0.09	(0.47)	0.20	-0.15	0.29
Uses	(0.55)	0.17	-0.01	0.27	(0.40)
KTG	0.22	-0.14	-0.16	(-0.40)	0.25
WTG	0.23	(0.70	0.13	-0.18	0.26
NVRT	(0.45)	(0.70)	(0.36)	-0.14	(0.84)
Neuro	-0.10	-0.17	(-0.63)	-0.24	(0.49)
Extr.	-0.16	-0.09	0.10	0.21	0.08
Lie	(-0.45)	-0.14	0.25	(0.49)	(0.53)
Defence	-0.03	0.20	(-0.63)	0.18	(0.47)
Auth	(0.32)	0.07	0.10	0.01	0.12
Socon	0.05	-0.13	0.24	0.10	0.09
Rigidity	-0.09	0.08	-0.24	(0.43)	0.26
Fee	-0.15	0.25	-0.12	(0.44)	0.29
Maths	(0.8)	-0.28	0.04	0.24	(0.78)
Engl	(0.67)	-0.10	-0.15	-0.13	(0.50)
SS	(0.65)	-0.15	0.05	-0.10	(0.46)
PS	(0.70)	-0.11	-0.20	0.24	(0.60)
Kagan C	-0.20	(0.32)	0.14	0.26	0.29
Witkin C	0.10	-0.28	(0.64)	0.21	(0.54)
Eigen Value Latent Root	3.16	1.56	1.33	1.44	
Variance %	44.4	21.7	18.5	13.8	

Note: Factor loadings in brackets are significant.

Factor I shows the uses test (Divergence test) grouped with NVRT and all the attainment tests namely; Mathematics, English Language, Social Studies and Primary Science. Lie also came up but negatively. Factor II came out with Elaboration, Kagan C (Divergence and Reflectivity) tests) and NVRT positively. But WTG (Field Independente) came out negatively. Only NVRT and Defence came out in Factor III but the later is negative. In Factor I Rigidity, Lie and KTG were the only significant variables even though KTG came out negatively.

The findings here tend to confirm the outcome in Factor I for boys of Group I. Three significant loadings in Factor I for girls (Uses, NVRT and less rigidity) came out positively with all the attainment tests.

c) The combination of boys and girls of Group I tend to conform previous findings. Four factors came out as indicated in Figure 4.6.3. Factor I came out with Uses (Divergence), NVRT and lie (Negative) with all the attainment tests.

Factor II came out distinctly with four personailty dimensions namely: Defence, Rigidity, and Fee with positive significant loadings. Factor III indicated three variables coming up negatively, these are KTG (reflectivity) Neuroticism and extraversion. A negative significant loading of Witkin C was noticed with Socon and Mathematics.

Table 4.6.3

Factor Matrix: Group I All

Variables	Factor I	Factor II	Factor III	Factor IV	COmmunalty (h^2)
Elab	0.11	0.13	(-0.31)	0.15	0.15
Uses	(0.56)	0.27	-0.11	-0.10	(0.42)
KTG	0.19	-0.14	(0.31)	0.18	0.19
WTG	0.19	-0.24	-0.13	0.03	0.11
NVRT	(0.50)	0.27	(-0.46)	0.13	(0,55)
Neuro	-0.14	0.11	-0.21	(-0.31)	0.17
Extr.	-0.20	0.03	-0.18	(-0.37)	0.20
Lie	(-0.30)	-0.23	0.02	0.27	0.22
Defence	-0.07	(0.37)	0.11	0.06	0.15
Auth	(0.30)	0.03	(0.33)	0.18	0.26
Socon	0.04	0.16	(0.45)	(0.48)	(0.50)
Rigid	-0.19	(0.50)	0.02	-0.14	(0.31)
Fee	-0.01	(0.56)	0.01	0.08	(0.33)
Maths	(0.60)	-0.09	0.28	0.07	(0.45)
Engl	(0.71)	-0.04	-0.04	-0.07	(0.51)
SS	(0.45)	-0.18	-0.02	0.01	0.24
PS	(0.64)	0.02	0.19	0.01	(0.50)
Kagan C	(-0.35)	0.07	(0.33)	0.25	(0.30)
Witkin C	0.16	0.01	-0.07	0.21	0.28
Eigen Value Latent Root.	2.75	1.32	1.07	1.00	
Variance	45%	22.4	13.2	5.30	

Note: Factor loadings in brackets are significant.

d) When the factor matrix of boys in Group II of the study was attempted, a clearer picture came out about the relationship of learning style with attainment on one hand and personality dimensions and attainment on the other hand. Table 4.6.4 illustrate this finding.

Elaboration (divergence) came out with positive significant loadings with Mathematics, English Launguage Social Studies and Primary Science. An additional positive significant loading of authoritarianism was also indicated in Factor I. Factor II illustrate the learning style and personality dimensions.

Uses (Divergence) came out with positive significant loadings with Defence, Authority, Socon, Rigidity and Fee. This distinction was made clearer by the observed negetive loading of WTG (Field Independence) and the above personality dimensions. Factor III indicated three significant positive loadings of two learning styles WTG, Witkin C (Field Independence) and KTG (Reflectivity). Factor IV on the other hand indicated significant positive loadings of lie and negative loading of Rigidity on Witkin C (Field Independence

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e) Like the previous four factor Matrices each of which gave four orthogonal factors, the girls in Group II of the study also produced four facrors. Factor I (Table 4.6.5) indicate significant positive loadings of personality dimensions of Authority, Socon, Rigidity,

Table 4.6.4

Factor Matrix: Group II Boys

Variables	Factor I	Factor II	Factor III	Factor IV	Communalty (h^2)
Elab	(0.40)	0.10	0.14	0.21	0.23
Uses	0.08	(0.45)	0.05	-0.12	0.23
KTG	0.08	(-0.34)	(0.46)	-0.18	(0.40)
WTG	(0.31)	(-0.40)	(0.59)	-0.27	(0.60)
NVRT	0.20	0.18	0.10	0.23	(0.40)
Neuro	-0.08	0.03	-0.26	0.03	0.08
Extra.	0.29	0.15	-0.20	-0.21	0.20
Lie	-0.12	0.08	0.08	(0.41)	0.22
Defence	0.01	(0.34)	0.17	0.06	0.15
Auth	(0.46)	(0.44)	0.10	0.14	(0.43)
Socon	0.19	(0.59)	0.10	-0.06	(0.40)
Rigid	0.16	(0.43)	0.08	(-0.35)	(0.34)
Fee	-0.08	(0.52)	0.23	-0.18	(0.40)
Maths	(0.62)	-0.02	-0.17	0.16	(0.44)
Engl	(0.53)	-0.09	-0.24	0.20	(0.40)
SS	(0.73)	-0.27	-0.08	-0.20	(0.70)
PS	(0.61)	-0.15	-0.13	0.19	(0.50)
Kagan C	-0.21	(-0.34)	-0.14	0.11	0.20
Witkin C	0.01	0.06	0.44	(0.30)	(0.30)
Eigen Value Latent Root	2.47	1.79	1.10	1.00	
Variance	40.1	29.0	17.0	5.30	

Note: Factor loadings in brackets are significant

Table 4.6.5

Factor Matrix : Group 2 Girls

Variables	Factor I	Factor II	Factor III	Factor IV	Communalty (h^2)
Elab	(0.31)	-0.02	0.25	-0.11	0.10
Uses	0.10	-0.05	0.09	-0.13	0.04
KTG	0.28	0.08	(-0.34)	-0.06	0.02
WTG	0.18	0.08	-0.15	-0.05	0.05
NVRT	(0.41)	0.04	0.08	(-0.43)	(0.40)
Neuro	(0.33)	-0.15	(-0.33)	(0.44)	(0.41)
Extr.	0.12	-0.2	-0.05	(0.30)	0.10
Lie	0.06	-0.12	-0.17	0.01	0.10
Defence	0.15	-0.20	(0.20)	0.26	(0.30)
Auth	(0.61)	(-0.41)	0.04	0.14	(0.54)
Socon	(0.50)	-0.28	(0.31)	0.08	(0.40)
Rigid	(0.50)	-0.29	(0.30)	0.06	(0.54)
Fee	(0.35)	(-0.44)	0.26	0.22	(0.42)
Maths	(0.35)	0.28	0.26	0.22	0.26
Engl	(0.44)	(0.40)	0.04	-0.19	(0.40)
SS	(0.40)	(0.66)	-0.01	0.23	(0.60)
PS	(0.41)	(0.57)	0.04	0.18	(0.53)
Kagan C	-025	0.03	(0.59)	-0.26	(0.50)
Witkin C	(0.37)	0.09	0.08	-0.23	0.20
Eigen Value Latent Root	2.46	1.93	1.5		
Variance	44.6	31.0	24.4		

Note: Factor loadings that are in brackets are significant.

and Fee and all the attainment scores on Witkin C (Field Independence). A significant positive loading of Elab and NVRT was also indicated.

Factor II indicates significant negative loadings of Authority and Fee with English Language, Social Studies and Primary Science. Factor III indicates significant positive loading of Rigidity and Defence on Kagan C (reflectivity).

f) When the factor matrix of boys and girls in Group II was attempted four independent factors surfaced. Under factor I three personality dimensions had Significant positive loadings with all the attainment tests. The personality variables include Authoritarianism, Socon and Rigidity, NVRT and Elab also had positive loadings with these personality variables. Factor II produced five personality variables namely, defence, Authoritarianism, Socon and Fee along with three attainment scores which leaded negatively. Factor III produced only two significant loadings viz:KTG and WTG. Only extraversion came out significant in factor IV but in negative dimension. These are all reflected in Table 4.6.6 below.

g) In order to discover a global view of relationships, a factor matrix of the entire population was designed. Table 4.6.7 below give a vivid description of findings. Four factors surfaced as was observed for Group II sample. Divergence distinctly came out in Factor I

Table 4.6.6

Factor Matrix: Group II All

Variables	Factor I	Factor II	Factor III	Factor IV	Communalty (H^2)
Elab	(0.31)	0.04	-0.06	0.22	0.11
Uses	0.11	0.21	-0.11	-0.10	0.10
KTG	0.19	-0.14	(0.53)	-0.20	(0.40)
WTG	0.21	-0.18	(0.43)	-0.14	(0.10)
NVRT	(0.31)	0.12	0.05	-0.15	0.14
Neur	-0.18	0.00	(0.34)	0.05	0.15
Extr.	0.22	0.12	-0.25	-(0.31)	0.21
Lie	-0.03	0.12	0.13	0.29	0.11
Defence	0.15	(0.32)	-0.14	0.16	0.15
Auth	(0.54)	(0.39)	0.14	0.06	(0.50)
Socon	(0.41)	(0.43)	-0.11	0.10	(0.10)
Rigid	(0.43)	(0.43)	-0.16	-0.16	(0.40)
Fee	0.22	(0.54)	0.10	0.14	(0.40)
Maths	(0.46)	-0.22	-0.22	0.12	(0.31)
Engl	(0.49)	(-0.30)	0.10	0.11	(0.33)
SS	(0.58)	(-0.54)	0.07	0.12	(0.64)
PS	(0.52)	(-0.40)	-0.12	0.10	(0.50)
Kagan C	-0.21	-0.17	-0.12	0.29	0.20
Witkin C	0.23	0.11	0.28	(0.37)	0.28
Eigen Value Latent Root	2.24	1.66	00.92		
Variance %	44.4	33.6	22.0		

NOTE: The factor loadings that are in brackets are significant.

Table 4.6.7

Factor Matrox: Group I & II All (N = 277)

Variables	Factor I	Factor II	Factor III	Factor IV	Communalty (h^2)
Elab	0.24	0.07	-0.08	0.01	0.15
Uses	(0.59)	0.22	(-0.34)	-0.21	(0.54)
KTG	0.22	-0.08	-0.07	-0.01	(0.06
WTG	0.20	-0.14	-0.03	0.16	0.08
NVRT	(0.69)	-0.23	(-0.49	-0.02	(0.80)
Neuro	-0.21	-0.01	0.06	(-0.45)	(0.30)
Extr	0.14	0.02	0.14	(0.30)	0.10
Lie	-0.21	0.04	0.12	(0.40)	0.22
Defence	0.12	(0.41)	-0.14	-0.11	0.20
Auth	(0.51)	(0.34)	0.15	0.15	(0.42)
Socon	0.26	(0.35)	(0.37)	0.17	(0.34)
Rigid	0.17	(0.40)	(0.39)	-0.15	(0.40)
Fee	0.13	(0.48)	0.22	0.15	(0.30)
Maths	(0.46)	-0.25	0.11	0.13	(0.30)
Engl	(0.58)	-0.29	0.04	0.03	(0.43)
SS	(0.44)	(-0.55)	(0.32)	0.04	(0.60)
PS	(0.54)	(-0.38)	0.19	0.02	(0.50)
Kagan C	-0.20	0.10	-0.13	0.03	0.10
Witkin C	(0.30)	0.14	-0.11	0.29	0.20
Eigen Value Latent Root/	2.02	1.49	1.00		
Variance %	49.2	29.6	21.2		

Note: Factor loadings that are in brackets are significant.

with significant positive loadings of all the attainment tests. In addition, NVRT and Authoritarianism also surfaced with significant loadings.

However, Factor II indicated a different dimension. Here personality traits of Defence, Authoritarianism, Socon, Rigidity and Fee appear not to be helpful in Social Studies and Primary Science attainment as these two attainment variables only came out with significant negative loadings with the personality traits.

Prom the factor matrices above, we notice that most of the cases (except Group II girls) the first common factor contained significant positive loadings for all the attainment tests and divergence, NVRT and just a few personality traits. This factor explains a total variance of between *40*% to 49.2% of the entire population. Based on this findings, and on the basis of orthogonality of the factors extracted, hypothesis 4 postulated in this study was rejected.

The girls of Group II also had a second factor having attainment test with significant loadings In addition to the first factor. This could only have happened by chance. In the other factor matrices, the second and third including the fourth factor wherever it surfaced had attainment tests with negative significant loadings, which goes to prove further that hypothesis 4 of the present study should be rejected.

SUMMARY

In this chapter, the data matrix was subjected to statistical analyses in order to test the various hypotheses set for the study. Essentially, ANOVA subprogramme of the SPSS was used for the first hypothesis. Partial correlation method was applied in order to resolve hypotheses two and three. These were manually calculated to make for precision although the major data used was from the correlation matrix out put of Iya Abubakar Computer Centre of Ahmadu Bello University, Zaria. Comments on unique findings from the correlation matrices will be made in Chapter 5.

Analyses indicated the relationship between learning styles and school attainment, between school attainments and the Non Verbal reasoning Test and also between learning styles and a personality trait. The application of subprogramme "Factor Analysis" gave significant indication of the relationship of learning styles, school attainment and scores on the Non Verbal Reasoning Test.

CHAPTER V

SUMMARY, DISCUSSION, IMPLICATIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The results of the analyses of data of the previous chapter need to be summarized now.

Hypothesis I

Putting hypothesis I into test meant that we had to find out the attainment scores of the divergers, the convergers, reflective, the impulsive, the field independent and the field dependent children in each of the four school academic subjects. The learning style tests used were respectively the Uses and Elab (divergence), the KTG and Kagan C (reflectivity) and WTG and Witkin C (field independence) tests.

In order to get a sharp distinction between the divergers, reflectives and implulsives and between the field independent and field dependent children the criterion of 25% of the top scorers and 25% of the bottom scorers was used. We noticed that the divergers being the top 25% of the Uses and Elab tests performed significantly better than the convergers in Mathematics, English and Primary Science - for children of various subgroups and (N=277) - (Tables 4.2.1 to Tables 4.2.10). On the basis of these results, hypothesis 1(a) was rejected.

Similarly the reflective children being the top 25% scorers in KTG performed significantly better than the impulsive children in English, Social Studies and Primary Science for children of various groups and (N=277) (Tables 4.2.1 to 10). On the basis of these significant results hypothesis 1(b) was rejected.

When KTG and Kagan C scores were used to cut off the reflective and impulsive children, we noticed that the reflective children performed significantly better than the impulsive children in Social Studies, Mathematics, English and Primary Science (Table 4.2.11 to 4.2.24). On the basis of these significant differences hypothesis 1(b) was rejected within the meaning of the above context.

When the WTG scores were used for the purpose of cutting off the field independent and field dependent children, we noticed that the top scorers, i.e. the field independent children performed significantly better in Mathematics, English, Social Studies and Primary Science for children of various groups and (N=277) (Tables 4.2.25 to 35). On the basis of these significant differences hypothesis 1(c) was rejected.

Hypothesis 2

When the effect of the Non Verbal Reasoning Test was partialled out from the relationship between learning styles and school attainment we noticed that Divergence remained significantly correlated with English, Mathematics, Primary Science, and social studies for various subgroups of the research (Tables 4.4.1 to 4.4.8). The Field Independence test also correlated significantly with Social Studies, Mathematics and English at 0.05 to 0.001 levels of confidence (Tables 4.4.9 to 4.4.13). On the basis of these significant results hypothesis 2 was rejected. Only Mathematics remained significantly correlated with Reflectivity when NVRT was partialled out (Tables 4.4.14 to 4.4.15).

Hypothesis 3

When the effect of NVRT was partialled out of the relationship between attainments and personality traits, we noticed that authoritarianism as a personality trait remained significantly correlated with attainment in Mathematics and English. There were no other significant results in respect of the relationship between attainment and personality when the effect of NVRT was partialled out. On the basis of these significant results, hypothesis 3 was partly rejected (Table 4.5.1 to 4.5.2).

Hypothesis 4

When the data matrix was factor analysed, we noticed the significant positive loadings of Uses (Divergence) and or Elaboration, NVRT, Authoritarianism and the attainments in Mathematics, English, Social Science and Primary Science came out as significant loadings in the first factor which was discovered to account for 40 to 49.2% of the total common variance. (Tables 4.5.1 to 4.5.7). This pattern was apparent in all the factor matrixes except Group I boys and Group 2 girls who came out with additional personality traits. On the basis of these significant results of Factor Analysis, hypothesis 4 was rejected within the meaning of the above context.

5.2 Discussion

The object of this study was to determine the relationship of learning styles and personality with primary school attainment. The results of the study suggests that while learning styles are of immense importance in school attainment, the role of personality is much less. However, some of the important findings require some explanation in form of discussion. The explanation also relate to previous findings by other researchers.

1. That the divergent pupils were better in Mathematics, English Language, Social Studies and Primary Science attainments is an important finding. The explanation for this finding is not difficult to speculate. The concept of divergence itself connotes fluency with words, associations and ideas and the tendency to revise what was already known. It implies the ability to project new forms of thought instead of depending on habitual forms of thought (Ferguson, 1956). It also gives the idea of openness of mind, inquisitiveness and therefore a higher level of motivation and aspiration. With these at the back of our minds the better performance in all school attainments by divergers becomes a bit clear.

The finding deserves greater attention of researchers because of the school of thought that acknowledges the superiority of convergers. But the present finding is not unprecedented. Hudson's Cambridge experiment (1963) in Hudson (1966) in which candidates were admitted on the basis of their scores in open-ended test of "Unusual Uses" and the comparative better terminal degrees obtained by these candidates give classical support to the present finding. Getzels and Jackson's discovery (1968) that divergers equalled convergers in

school attainment and that the groups did not differ in their achievement motivation; and Hassan and Butcher's discovery (in Mukherjee, 1978) of considerable overlap in school attainment between the divergers and convergers further give weight to the present finding.

More importantly, Nuttall's submission (1971) that divergent thinking is far from being a unitary trait but is better considered as a number of distinct abilities including verbal divergent thinking factor, diagramatic factor and numerical factor provide further explanation needed for the diverger's superiority over the convergers and in most school attainments. These factors reffered to by Nuttall should rightly account for the divergers' higher attainments in the school subjects researched.

2. The findings of the significant difference in attainment between the reflective and impulsive, and between the field independent and field dependent pupils is straightforward. The reflective and the field-independent perform significantly better than their impulsive and field dependent counterparts. This was not surprising as the reflective and the field independent pupils tend to share some characteristics. If to be reflective is to possess the ability for painstaking deep thought and ability for

Kagan C (Reflectivity) and Uses but, again, none of these reached any significant level of confidence. In some cases, negative correlations were recorded as evidenced in WTG (Field independence) and KTG (Reflectivity) (Table 4.3.6). What these findings tend to show is the confirmation of Western oriented researches (Kagan, 1968; Witkin, 1970) about the distinctiveness of the learning styles. As there were no significant correlations to work with, it was useless adopting the methods of partialling out the effect of one learning style from another in order to detect any spurious relationships.

3. Perhaps a discovery which has a great implication for education was the general and highly significant relationship between learning styles and attainment when the effect on NVRT was partialled out Eight different significant relationships were discovered between divergence and school attainment when the NVRT was partialled out (Tables 4.4.1 to 4.4.8) in contrast with the relationship between reflectivity and attainments. Only two significant relationships were discovered using the partial correlation methods (Tables 4.1.9 to 4.1.10) Whereas divergence remained significantly related with Mathematics, English Language, Social studies and Primary Science attainments, reflectivity sustained relationship with only Mathematics after

partialling out the effect of NVRT. Field independence on the other hand was closer to divergence in the degree of correlations discovered. It recorded five significant relationships; two with English Language, two with Social Studies and one with Mathematics.

The above evidence further gives weight to the general contention about the distinctiveness of each learning style. But it would appear here that while divergence and field indpendence tend to be more broadly spread in their relationship with school attainments, reflectivity was greatly restricted. The generalization then is that the divergent individual stands a greater chance of relatively performing better in Primary school attainments than the reflective or fiend independent children.

4. Whereas learning styles remained significantly related with attainment when NVRT was partialled out, the situation was different when NVRT was partialled out of the relationship between attainment and personality, (Hypothesis 3). Of seven personality traits researched only one (Authoritarianism) remained significant when the effect of NVRT was partialled out. It showed significant relationship with Mathematics and English at 0.01 and 0.05 levels of confidence respectively (4.5.1 and 4.5.2) (N = 277)

This finding contradicts the Western world findings where liberalism is known to be highly related with attainment which is understandable from the political phylosophy of these countries which is "democracy". Although Nigeria also professes "democracy" the variable of culture appears to play a more dominant role here. In Africa and specifically Nigeria, we are still dominated by traditions, we are extremely dependent and superstitious (Durojaiye, 1972). The place of age is venerable. He who is predisposed to these "virtues" is bound to have greater favour with the elders and the school teachers more so, the primary school teachers. Authoritarianism also connotes the idea of confidence, supremacy, and self assurance which could be an area for further research.

Furthermore, it is feasible to think that it is the high performance of the diverger that places him in a position of confidence, pride and a start amongst his peers. This predisposition is a likely explanation for his authoritarian trait. He was likely to become arrogant and forceful. The question then arises: Is it attainment that account for authoritarian personality trait? Such causal factor should arm the school teacher in his attempt to improve the attainment of pupils.

What our findings in respect of personality and attainment seem to suggest is some sort of remote relationship. Perhaps our failure to locate many more significant relationships between personality and attainment could be due to the type of personality traits researched. These were adapted from Hudson's (1961) and Eysenck's (1971) researches. When more validated indegenous personality tests are made widely available, it is likely that more findings on the relationship between personality and attainment will be uncovered. It is also possible that Hudson's personality traits failed to discriminate sufficiently; however, correlation matrices in Tables 4.3.4 to 4.3.7 indicate that authoritarianism as a personality trait correlated with social conformity, rigidity and freedom of emotional expression.

The issue of remote relationship of personality and attainment can be sustained further by other findings in the study. Whereas our correlation matrices (4.3.1 to 4.3.7) indicate some positive correlations between personality and attainment (and there were some negative as as well): such positive correlations failed to be sustained when the effect of NVRT was partialled out. This is a statistical indication that what ever relationship that was apparent between personality and attainment was due to the effect of NVRT.

The statistical application of Factor Matrix - a more powerful statistics than correlation methods, (Niel et al, 1980) was helpful in reaching final conclusions about the relationship of personality and attainment. This was in respect with the general consistent negative loading of the attainment tests with the personality traits except authoritarianism (Tables 4.6.4, 4.6.6 and 4.6.7). That this result included the entire population of the sample (N=277) gives weight to this finding.

What these findings therefore tend to emphasize is the possibility of cultural difference which educationists must respect. In other words, the discovery of consistent relationship of authoritarianism with attainment (Tables 4.6.1 to 4.6.7) is more than a chance occurence. This finding is therefore consistent within the meaning of the findings of this study.

5. Perhaps some comments are necessary on the methods adopted to explore the above findings. The correlation matrices (Tables 3.4.1 to 3.4.7) clearly established the importance of NVRT in relationship with attainment. Thereforem the only way out to establish the independent contribution of personality to attainment was to partial out the effect of NVRT. This was the

approach used to resolve hypothesis 3 and the result was far-reaching as presented above (Tables 4.5.1 and 4.5.2).

6 The findings from Factor Ianalyses (Tables 4.6.1 to 4.6.7) tend to summarize the important findings of this study and more so, helped to validate the findings of hepotheses 1 to 3. For example, the first common factor of all the seven sub groups of the study indicated the relationship of learning styles and attainment which accounted for 40 to 49.2% of the total variance. Only three of the seven sub groups had personality traits grouped with attainment (Tables 4.6.5 to 4.6.7). This gave an indication of the relationship between personality and attainment even though the relationship was much less and particularly spurious. Factor 3 and 4 failed to give any pattern in the way Factor 1 did though these contributed some 17.2% of the total variance; which shows how less important they are.

Perhaps some comments are necessary in respect with some of the unique and interesting outcomes of the correlation matrix. This is in spite of the fact that no hypotheses were meant to be resolved and no decisions were purely based on the correlation matrices because of low power of the statistic (Fergusson, 1971). This was why an alternative

statistic, the partial correlation method was adopted for decisions(Niel, 1980). The need to go into correlation matrices derives from the fact that the partial correlation method requires correlation output especially those that are correlated at 0.001 level of significance.

1. The pattern of intercorrelations between the Non-Verbal Reasoning Test and most of the school subjects researched was not surprising. The NVRT could easily be taken as a standardized test of attainment. That it correlated so highly with school attainment is a pointer to the reliability of attainment scores used for the study.
2. The pattern of correlations between the academic subjects was probaly an indication of the low level of subject specialization in the primary schools researched. Attainment, it would seem at this level of education, depended greatly on 'g' factor of intelligence (Guilford, 1957). This tends to explain the difference in the findings of Hudson (1966) who worked with undergraduates whose subject specialization had already begun.
3. The consistent negative correlation between attainment and Eysenck's Neuroticism (1965) Tables 4.3.1 to 4.3.7) conform with previous

findings of authorities such as Eysenck (1965), Cookson in Butcher and Point (1973) Lovegrove (1974), Mohammed (1980), Child, and Smitters, (1980). The result of high anxiety can always be expected to be disruptive to learning although the investigator is unaware of any research that has been able to measure the level of anxiety that could serve as motivation for learning.

There was an established pattern of positive relationship between learning styles, attainment and personality traits through out the correlation matrices. But the discovery of negative correlation between extraversion and English ($P < 0.05$) Table 4.2.1 and Elab ($P < 0.01$) Table 4.2.3 was unique. Although the possibility of chance can not be dismissed, previous work by Eysenck and Cookson (1969) and Lovegrove (1974) tend to provide some explanation. Cunningham and Entwistles's study (1968 on one hand and Eysenck and Cookson's (1979) on the other hand which involved about 7000 pupils failed to reach agreement with respect to relationship of extraversion and attainment. Lovegrove's study (1974) ended up with divergent findings with respect to extraversion and attainment

among Americans, Negroes, Iranians, Ghanaians and students of Alvan Ikoku College of Education, Owerri, Nigeria. The finding in the present study therefore only contribute to the unending research in this field and the need for more in other to highlight hidden yet undiscovered controlling factors.

4. The finding of correlation between extraversion and neuroticism ($P < 0.05$) Table 4.3.7 require some comments here. While the possibility of chance is logical (on significant correlation ($P < 0.05$) out of seven possibilities; there is the possibility that the numerousity of variables fed into the computer could increase the chance of intercorrelation. This is more so in terms of the low power of the statistic used. However, this finding is not without precedence. Eysenck, in the "Manual of JEPI" (1965) recorded three similar correlations in his matrices. Also, Mohammed (1980), working on "A normative study of extraversion, neuroticism, lie and the non-verbal reasoning test in Zaria schools had a similar finding in her result which involved about 1000 pupils.

Much as cultural explanation is feasible for explaining the finding (Mohammed (1980), it does seem that this finding could have resulted because of the distribution of scores on these two

variables. An examination of the means and standard deviations of these variables indicates that most of the subjects are easily classifyable as ambiverts - viz: the mean of extraversion scores was 15.11 while that of neuroticism was 12.05. The standard deviations were 2.94 and 3.58 respectively.

6. The correlation between extraversion and social conformity was natural - but unique in the sense that two dimensions of personality traits by two different authorities, Eysenck (1965) and Hudson (1966) appear to be measuring the same qualities. If by extraversion we imply outgoingness, socialization, paying premium on excitement and a high reactive inhibition Eysenck (1975), the positive correlation with social conformity becomes very clear. This is because Hudson's (1965) social conformist share similar characteristics with extraversion viz: mixing well socially, active, fond of 'arty' clothes, and a good team member (Hudson, 1966: 191). Perhaps, more important in the present finding is the scope at which individuals are willing to extend the meaning of extraversion and social conformity. The pausity of research

on social conformity unlike extraversion could be responsible for the seeming uniqueness of the present finding.

5.3 Conclusion

The present study which sought to determine the relationship of learning styles and personality with primary school attainment came out with the following conclusions tenable for the children of this research and similar children in other communities.

1. Learning styles are significantly related with primary school attainment.
2. Divergent Learning Style is more related with school attainment than other styles researched.
3. The learning style of reflectivity is more related to Mathematics attainment.
4. The divergers, reflectives and the field independent children perform significantly better in school attainment than the convergers, impulsive and the field dependent individuals.
5. Learning styles are more closely related to school attainment than the Non Verbal Reasoning test - the AH4 Part II.

6. Personality dimensions investigated have no significant relationship with attainment except authoritarianism.
7. Authoritarianism has direct relationship with English and Mathematics attainments.
8. Neuroticism as a personality trait is negatively related to primary school attainment.

5.4 Implications

In view of the results of analyses of data and conclusions arrived at, the following implications are of importance to educationists:

1. The discovery that the diverger, the reflective and the field independent individuals performed better in school attainment has relevance for teachers' methods. Some major criteria in the identification of these styles included the steadiness, painstakingness and lack of hurry or speed in giving answers to questions. In order to come to the correct answers unrestricted time limit was necessary for observation, comparism, quiet speculations and in the weighing of alternative answers. These reduces the probablility of unreasonable wrong gueses. These are characteristics which should be encouraged by teachers. As our research evidence has shown pupils with such

characteristics perform better in almost all the primary school attainments researched in this study. The teacher's patience is therefore necessary with pupils often erroneously assummed to be "dull", backward or disinterested in school learning. Maximum time should be allowed for any school tests/examinations or classroom assignments and, characteristics of impulsivity should be discouraged. If the teacher insists on time lag before calling pupils to answer questions, and if he discourages the individuals who likes to "show off" in ignorance, he is by so doing encouraging reflectivity.

Whereas, Nigeria has never at any given time depended so much on "intelligence" score for placement purposes, and where they are commonly used in Western countries the importance has continued to diminish especially with the continued research in the area of aptitude testing, The present study also underscores the importance of the NVRT over the learning styles. Therefore, for predictive purposes, in attainment, learning style. tests could be of greater advantage and this should be more emphasized.

3. The results of various analyses in this study however underscore the importance of personality in school attainment generally. Whereas some correlations were recorded in the correlation matrices (Tables 4.3.1 to 4.3.7) and also in the Factor matrices (Table 4.6.1 tO 4.6.7) the application of partial correlation analyses indicated that much of these correlations are spurious. Findings indicated that such correlations materialized only because of the effect of the performance in the Non-Verbal Reasoning Test. The implication of this is that less energy would have to be expended on personality traits if school attainment is the major goal. This however does not undersocre the importance of personality in inter personal relationship and hehaviour dynamics.

4. The finding that authoritatianism was closely related to attainment especially in Mathematics and English Language is an indication of our tradition and culture. If the operational definiton of authoritarianism as far as this study was concerned included obedience, respect for adults and a sense of responsibility, - teachers and parents alike, nd the society at large should endeavour to reinforce these

characteristics in children. Coincidentally, these are some of the characteristics that our society hold with esteem.

5. The partial correlation method and the factor analyses utilized for this study indicated the distinctiveness of learning styles even though each of the learning style was found to be related to attainment at different degrees. Since different pupils are likely to have different styles, this calls for respect of individual differences in pupils in terms of motivation techniques and teaching methodology. Indeed, a means whereby children of the same learning style are grouped together for classroom or group instruction should go a long way in improving pupils' attainment.

E. Recommendations

The analysis of data indicated that the divergers, the reflectives and the field independent children perform better in school subjects such as Mathematics, English, Primary Science and Social Studies than the covergers, the impulsive and the field dependent children. Furthermore, when the Non Verbal Reasoning Test Scores were partialled out from the relationship between learning styles and attainment, the relationship remained significantly sustained.

But the situation was not the same in the relationship between personality and attainment. Whatever relationship existed disappear when the Non-Verbal Reasoning Test attainment was partialled out.

The findings such as the above tend to give a valid indication of greater importance of learning styles in school attainment over the importance of personality traits. This discovery was further strengthened by the Factor Analyses method. Of the four factors produced from the complete datamatrices, all the subgroups indicated significant link between learning styles and school attainment including the Non Verbal Reasoning Test. In view of the above findings, it is recommended among other things that:

a) the type of learning styles that are more positively related to higher school attainments (divergence, reflectivity and Field independence) should be greatly encouraged by parents and teachers.

b) divergence, which was most positively related to attainment should be given a special place in the school's effort to build up pupils for classroom operations.

c) For predictive purposes learning styles should be more helpful than NVRT.

d) Less effort should ne expended on personality if the ultimate goal is school attainment.

e) the personality dimension of authoritarianism which was closely linked with school attainment should be encouraged.

f) schools should be less dependent on intelligence tests for placement.

g) conditions that predispose the development of divergent, reflective and field independent qualities should be researched and applied in homes and schools.

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APPENDIX A

Elaboration Test (Elab)

Name: .:.....

School:.....

Sex Boys

Girls

Dear Pupil,

Please, use what you have below to draw anything you like. Make your drawing as complete as possible. You will finally have 12 drawings. If you can write the name of what you have drawn for each particular case, you are free to do this. Thank you.









APPENDIX B

Uses of Objects Test (Uses)

Names.....

School .....

Boys

Sex

Girls

Dear Pupil,

Below are six common things you see almost every day. Think of as many uses as you can for each. You do not need to write in sentences if you like. Thank you.

A CUTLASS

A BLANKET

A BROOM

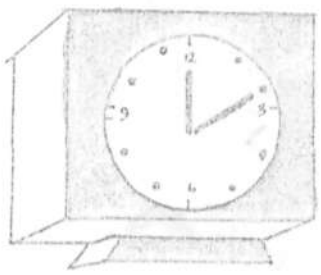
A STONE

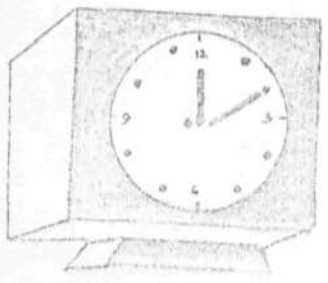
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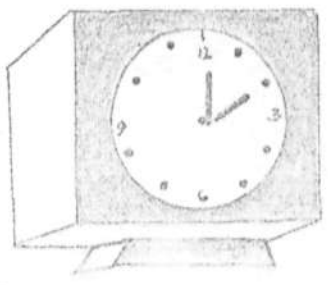
APPENDIX C

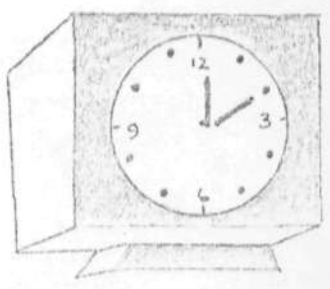
MATCHING FAMILIAR FIGURES TEST

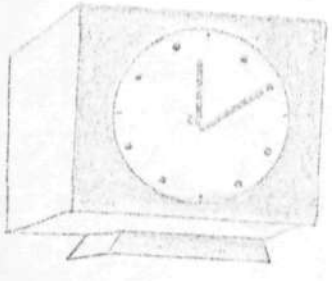
(REFLECTIVITY-IMPULSIVITY)

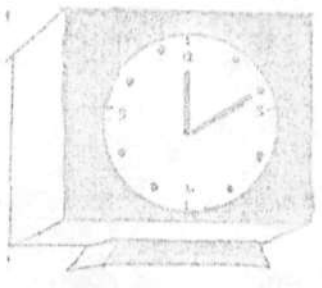


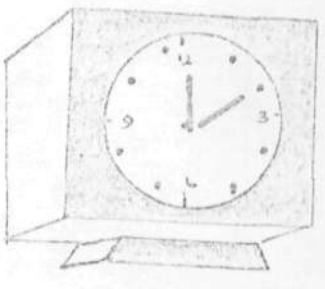


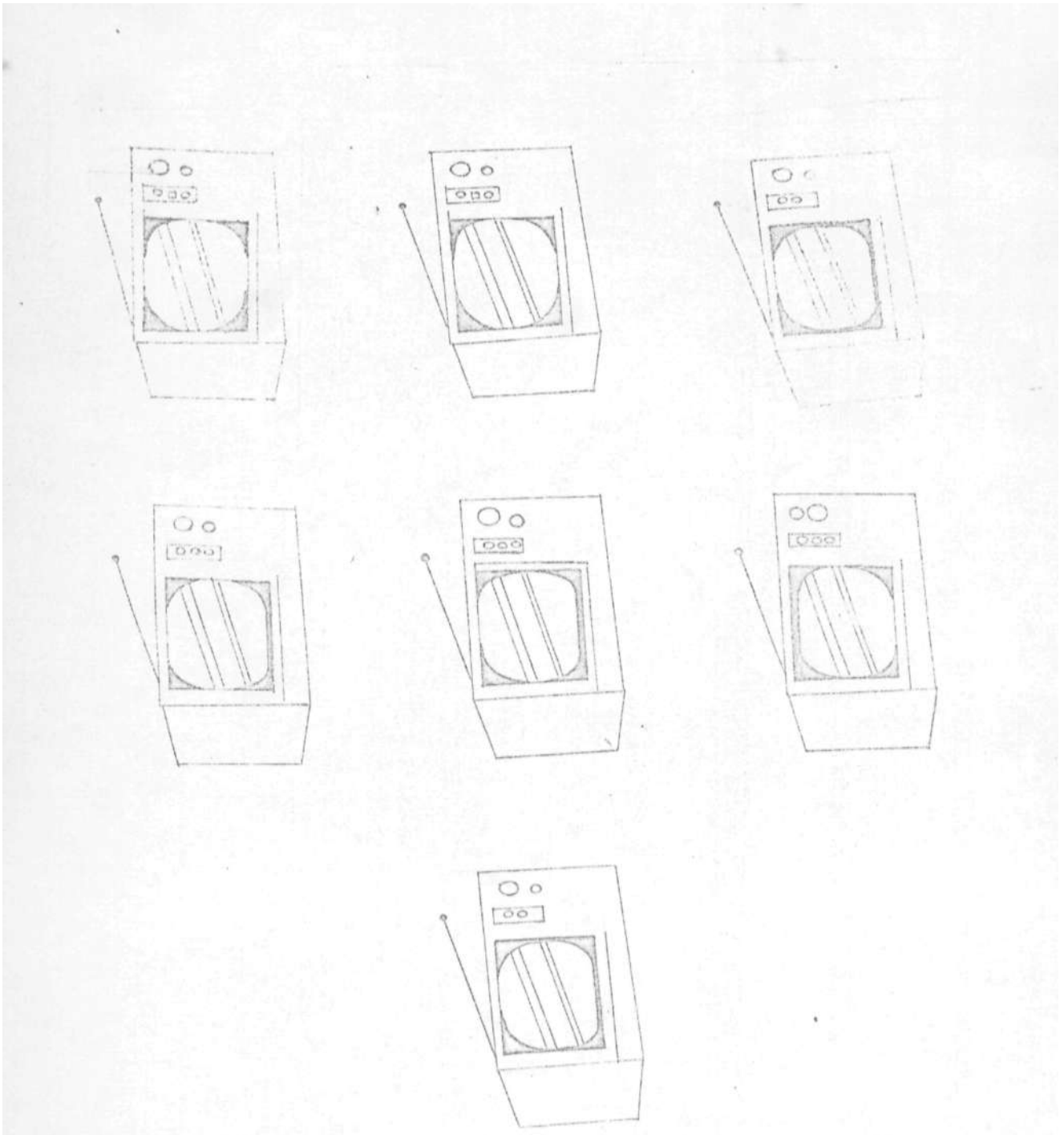
















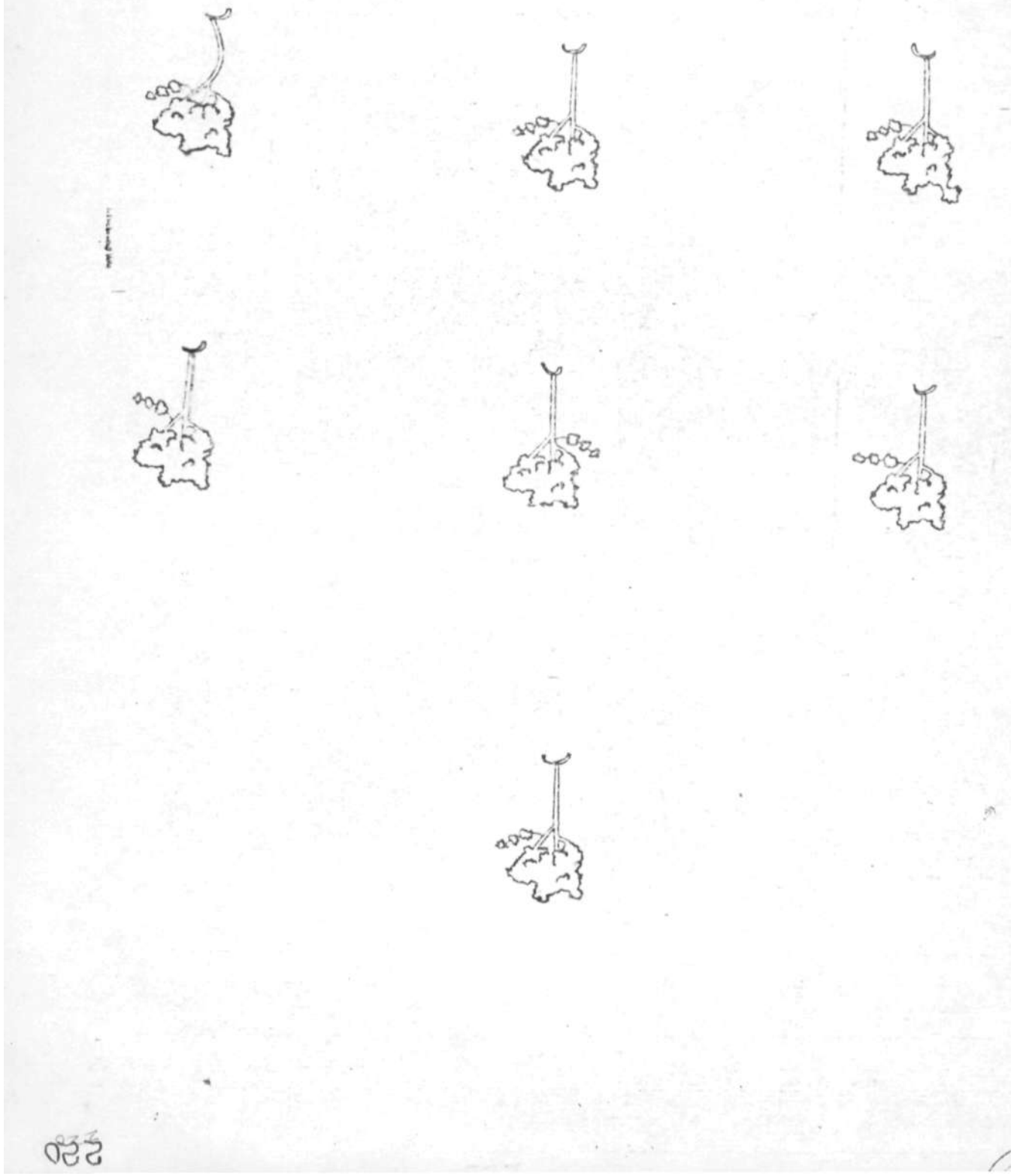


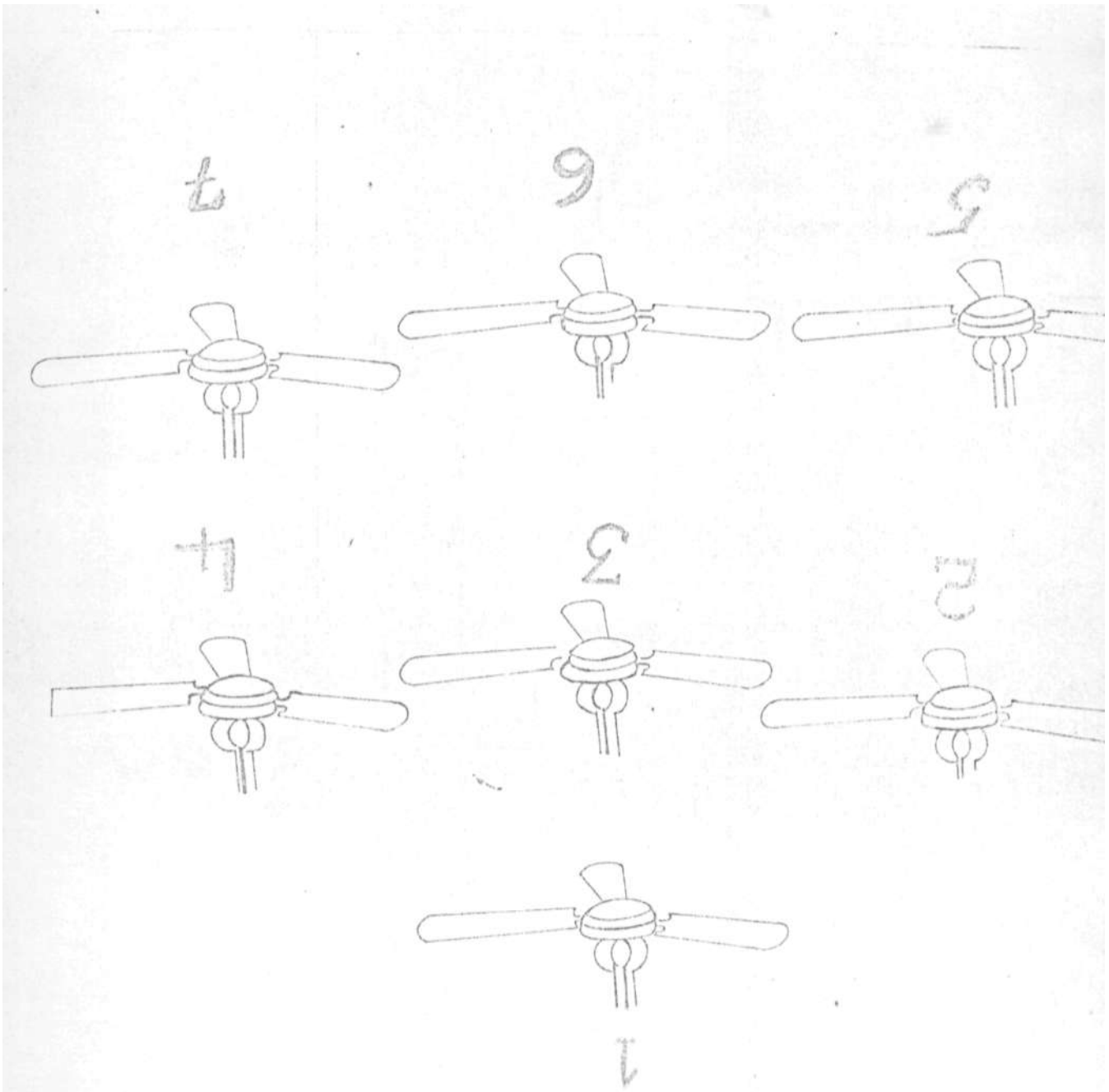











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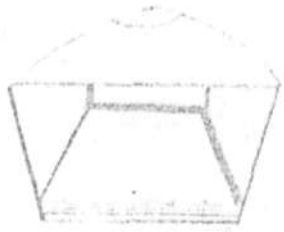
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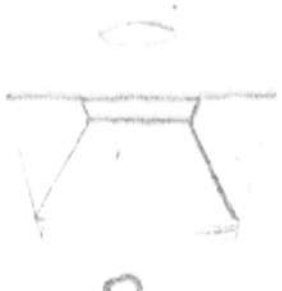




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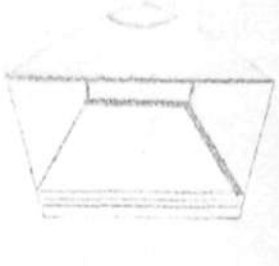
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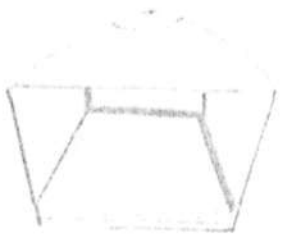
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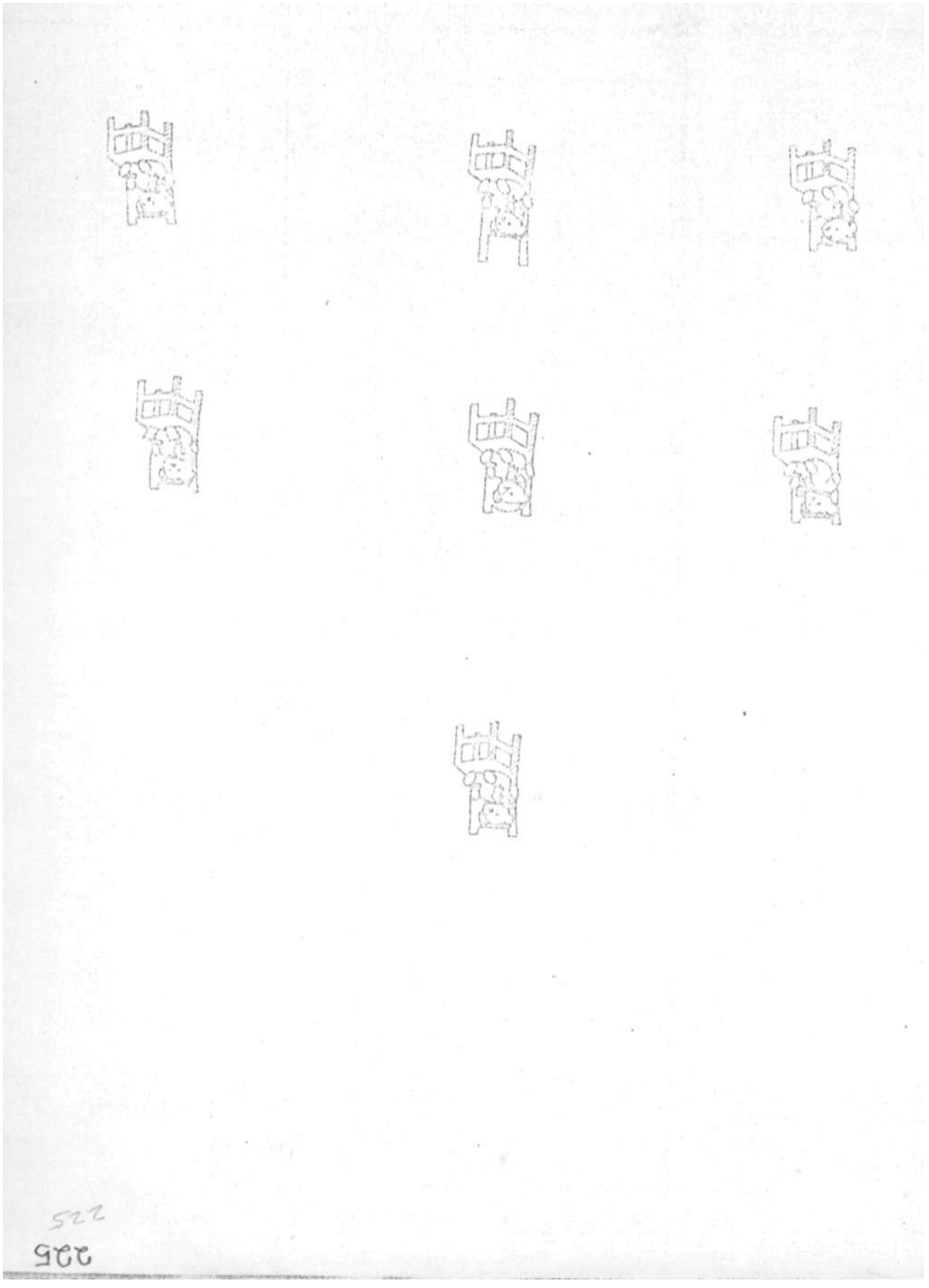

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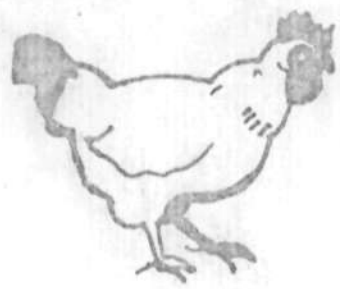


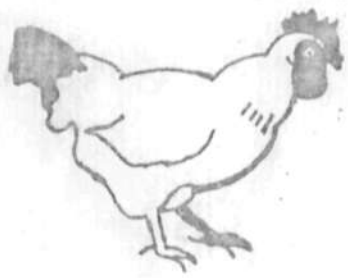


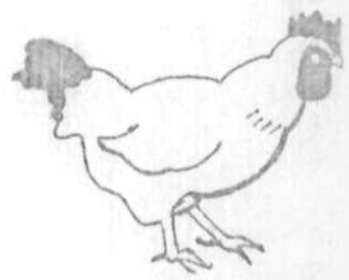


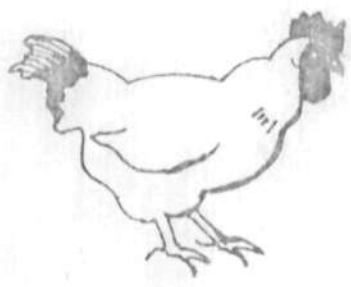


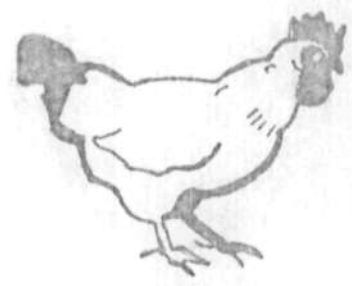
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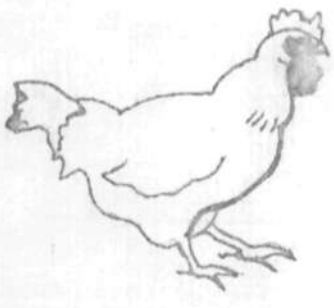


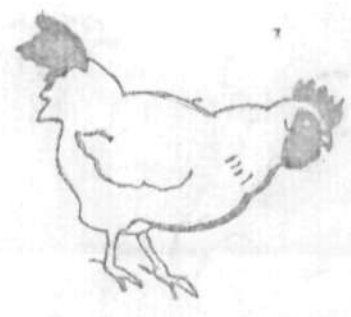




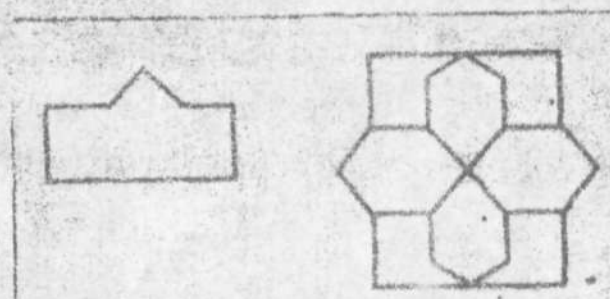


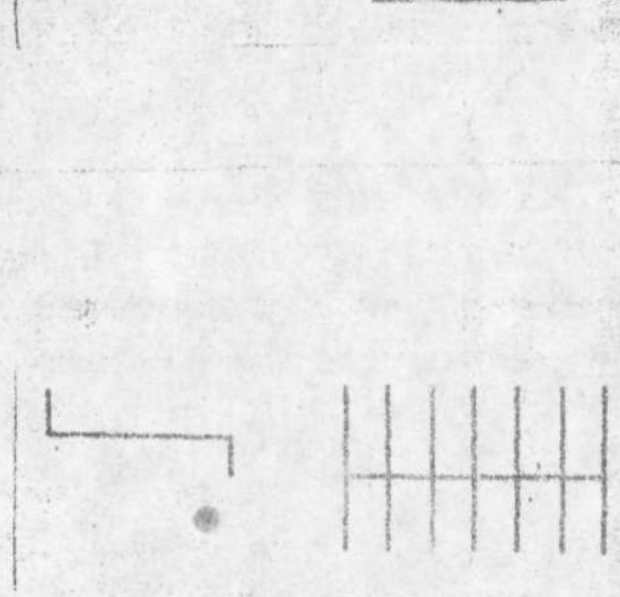


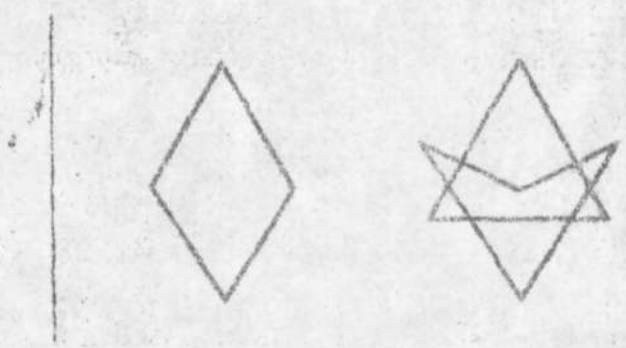




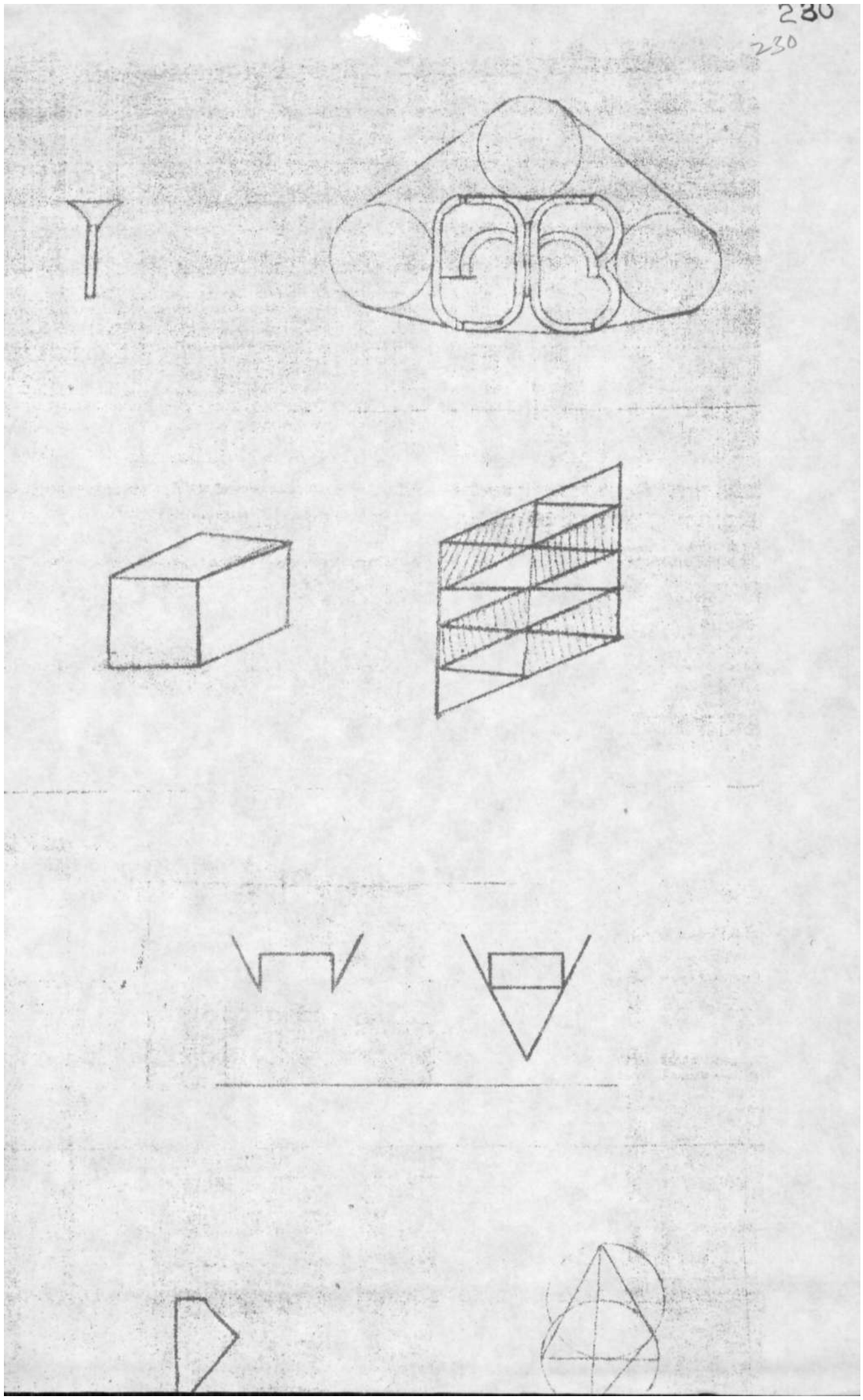
APPENDIX D



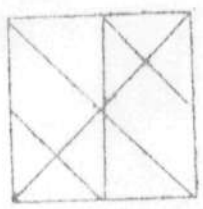


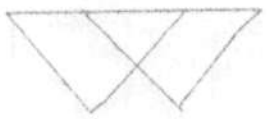


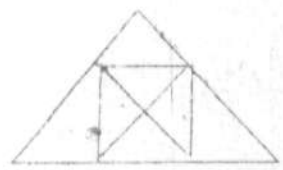
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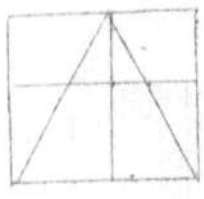












APPENDIX E

JUNIOR EYSENCK PERSONALITY INVENTORY

Here are some questions about the ways you behave, feel or act. After each question is a space for answering Yes or No. Try to decided whether yes Yes or No is your usual way of acting or feeling. Work very quickly, and don't spend too much time over any question. Make sure you answer all the questions. Tick (✓) Yes or No.

		Yes	No
1.	Do you like a lot of interesting activities going on around you?	( )	( )
2.	When you are sad do you often want your friends to make you happy?	( )	( )
3.	When people talk to you do you always answer quickly?	( )	( )
4.	Are you sometimes angry?	( )	( )
5.	Are you always sad?	( )	( )
6.	Do you like being alone always than mix with other children?	( )	( )
7.	Do you find it difficult sleeping	( )	( )
8.	Do you always do what you are told to do immediately?	( )	( )
9.	Do you enjoy jokes?	( )	( )
10.	Do you feel unhappy when there is nothing to make you unhappy?	( )	( )
11.	Do you find it easy to make friends?	( )	( )
12.	Have you ever broken any rules at school?	( )	( )
13.	Do many things make you feel angry?	( )	( )
14.	Do you like doing things at the correct time?	( )	( )

		Yes	No
15.	Do you get worried over whether bad things would happen to you?	( )	( )
16.	Have you always kept every secret?	( )	( )
17.	Can you make people enjoy a party arranged by you?	( )	( )
18,	Are you sometimes afraid?	( )	( )
19.	Ladi is your new friend. She spoke to you before you became friends?	( )	( )
20.	Have you ever told a lie?	( )	( )
21.	Do you feel unhappy when people do not like your work?	( )	( )
22.	Do you like telling stories which make your friends to laugh?	( )	( )
23	Do you often feel tired without knowing why?	( )	( )
24.	Do you always finish your homework before you play?	( )	( )
25.	Do you always feel happy?	( )	( )
26.	Do you sometimes feel unhappy about somethings?	( )	( )
27.	Do you like playing with other children?	( )	( )
28.	Do you pray every night?	( )	( )
29.	Do you sometimes find it difficult to know what to do?	( )	( )
30.	Do you like playing tricks on others?	( )	( )
31			
31.	Do you often feel fed up	( )	( )
32.	Do you sometimes boast a little?	( )	( )
33.	Are you mostly quiet when you are with others	( )	( )
34.	Do you sometimes get so restless that you cannot sit in a chair long?	( )	( )
35.	Do you often make up your mind to do things suddenly?	( )	( )
36.	Are you always quiet in class, even when the teacher is out of the room?	( )	( )

		Yes	No
37.	Do you have many frightening dreams?	( )	( )
38.	Can you usually let yourself enjoy yourself at a gay party?	( )	( )
39.	Are your feelings rather easily hurt?	( )	( )
40.	Have you ever said anything bad or nasty about anyone?	( )	( )
41.	Would you call yourself happy-go-lucky?	( )	( )
42.	Do you worry for a long while if you feel you have made a fool of yourself?	( )	( )
43.	Do you often like a rough game?	( )	( )
44.	Do you always eat everything you are given at a meal?	( )	( )
45.	Do you find it very hard to take no for an answer ?	( )	( )
46.	Do you like going out a lot?	( )	( )
47.	Do you sometimes feel life is just not worth living?	( )	( )
48.	Have you ever been cheeky to your parents?	( )	( )
49	Do other people think of you as being very lifely?	( )	( )
50.	Does your mind often wander off when you are doing a job?	( )	( )
51.	Would you rather sit and watch than play at any parties	( )	( )
52.	Do you find it hard to get to sleep at nights because you are worring about things?	( )	( )
53.	Do you usually feel sure you can do the things you have to do?	( )	( )
54.	Do you often feel lonely?	( )	( )
55.	Are you shy of speaking first when you meet new people?	( )	( )
56.	Do you often make up your mind when it is too late?	( )	( )

		Yes	No
57.	When children shout at you, do you shout back?	( )	( )
58.	Do you sometimes feel specially cheerful and at other times sad without any good reason?	( )	( )
59.	Do you find it had to really enjoy your self at a lifely party?	( )	( )
60.	Do you often get into trouble because you do things without thinking first?	( )	( )

APPENDIX F
PERSONAL QUALITIES QUESTIONNAIRE

One of the reasons why you come to school is for your teachers to help train your mind and character. But no one is very sure about the qualities your teachers should help you to develop and which should not. Say whether you agree or disagree by the use of (✓) with the following about what the teacher should help you to develop.

The school should train you to be:	Strongly agree	Little agree	Little disagree	Strongly disagree
1. Physically tough (strong)				
2. Like animals.				
3. Mix well with people				
4. Personally neat and clean				
5. Obedient				
6. Responsible (do the right thing at the right time)				
7. Have low opinion of yourself.				
8. Highly imaginative				
9. Have respect for adults				
10. Independent of parents				
11. Love people				
12. Always feeling happy				
13. Have strong beliefs				
14. Have consideration for others				
15. Behave like a woman				
16. Gentle				

The school should train you to be:	Strongly agree	Little agree	Little disagree	Strongly disagree
17. Accept advice from those who know very well				
18. Have courage				
19. Wear fancy clothes				
20. Have self control				
21. Use bad language				
22. Very well behaved				
23. Work together very well with other children				
24. Like Art work				
25. Hide strong feelings				
26. Behave like a man				

Your Names:.....

School: .....

Class:.....

Sex: Male .....

Female.....

APPENDIX G

NON VERBAL REASONING TEST (AH4 PART II)

In the test that follows you will find some items which are in form of pictures. The items are there to test your understanding of some sort of relationships between the pictures of every item. The right answer is one of the five alternatives given for every question. These alternatives are marked 1, 2, 3, 4, 5,. When you find the correct answer, write the Number of the correct alternative in the space provided at the right hand margin of the test. The test is not difficult; though the questions become difficult gradually. If you find any item to be difficult, then do not waste time on it, proceed to the following ones. There will be 10 minutes only for you to complete this test. Please remember that very few can complete the test in 10 minutes. So do not worry.

Now turn to page and let us look at the examples.

Item No. 1 has the correct answer as No. 4

Item No. 2 has the correct answer as No. 2.

DO YOU UNDERSTAND?

Will you now work out the items 3 to 10.

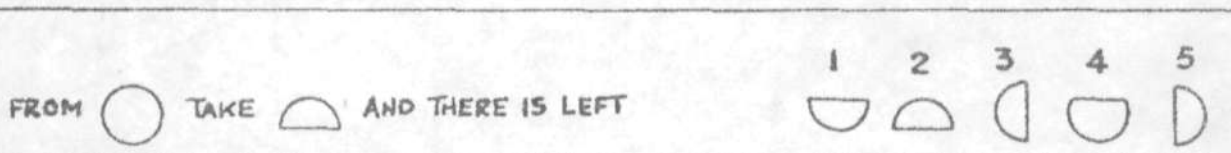
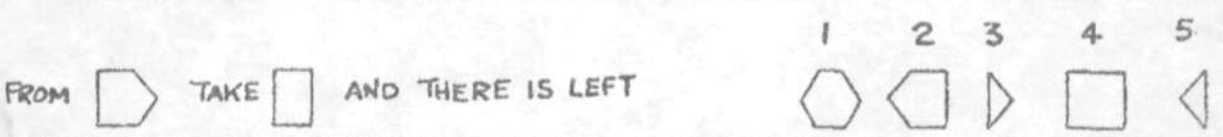
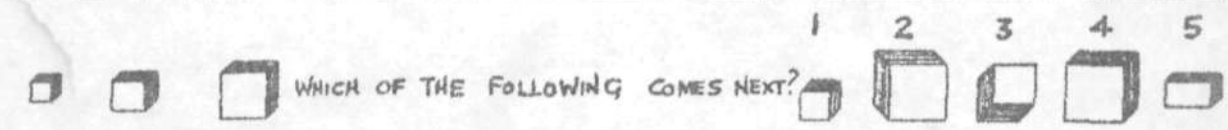
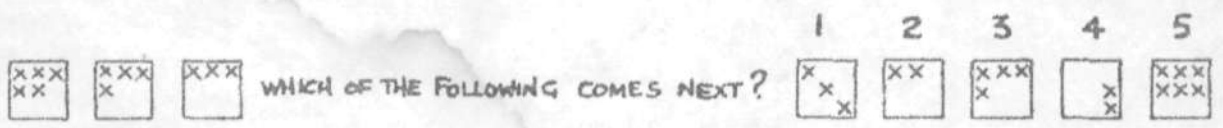
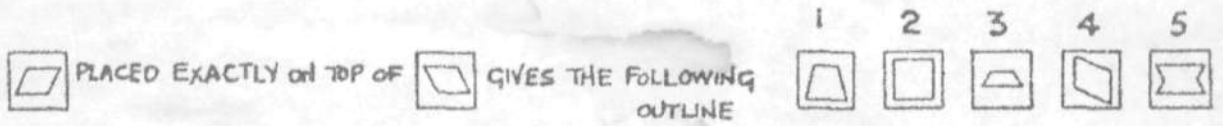
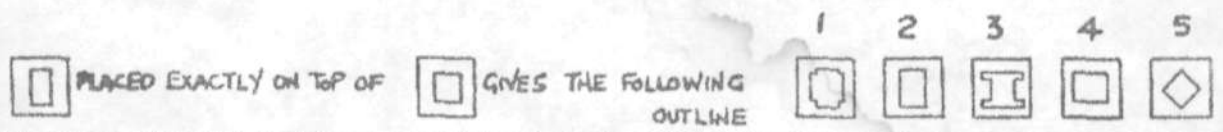
When you finish I shall tell you the correct answers and please check.

Student's Name:.....

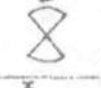
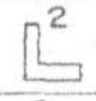
Class..... School:.....

Sex:..... Age:.....

PART II.
EXAMPLES.

QU. No.	DO NOT WRITE ANYTHING ON THIS PAPER.	QU. No.
1		1
2		2
3		3
4		4
5		5
6		6
7		7
8		8
9		9
10		10

	DO NOT WRITE ANYTHING ON THIS PAPER.	QU. Nº
1	□ IS TO ▢ AS ○ IS TO 1 ▯ 2 ▢ 3 ⌓ 4 ○ 5	1
2	⌐ IS THE SAME AS 1 ⌐ 2 ⌐ 3 ⌐ 4 ⌐ 5 ⌐	2
3	FROM △ TAKE ⩓ AND THERE IS LEFT 1 ◠ 2 ☾ 3 ▽ 4 ⌓ 5 ○	3
4	△ ▲ ▲ WHICH OF THE FOLLOWING COMES NEXT? 1 ▲ 2 ▲ 3 ◁▷ 4 ▲ 5 ▲	4
5	△ PLACED EXACTLY ON TOP OF □ GIVES THE FOLLOWING OUTLINE. 1 ⌂ 2 ▯ 3 ▽ 4 ◁ 5 ◥	5
6	◡ IS TO ◡ AS ▯ IS TO 1 ▯ 2 ▯ 3 ◢ 4 ▯ 5 ▬	6
7	◣ IS THE SAME AS 1 ◢ 2 ◣ 3 ◣ 4 ◣ 5 ◣	7
8	FROM ◇ TAKE ◡ AND THERE IS LEFT 1 △ 2 ◡ 3 ◯ 4 ▽ 5 ◡	8
9	▫ ▫ ▫ WHICH OF THE FOLLOWING COMES NEXT? 1 ⁘ 2 ⁘ 3 ⁘ 4 ⁘ 5 ⁘	9
10	✿ PLACED EXACTLY ON TOP OF ✿ GIVES THE FOLLOWING OUTLINE. 1 ✿ 2 ✿ 3 ✿ 4 ✿ 5 ✿	10
11	□ IS TO ▱ AS ▭ IS TO 1 ▱ 2 ▱ 3 ▭ 4 ◇ 5 ▱	11
12	◺ IS THE SAME AS 1 ◺ 2 ◺ 3 ◺ 4 ◺ 5 ◺	12
13	FROM ▢ TAKE ◺ AND THERE IS LEFT 1 ⌐ 2 ⌐ 3 ▷ 4 ◥ 5 ⌐	13
14	◿ ◸ ◸ WHICH OF THE FOLLOWING COMES NEXT? 1 ◇ 2 ◡ 3 ◇ 4 ◸ 5 ▢	14
15	⊚ PLACED EXACTLY ON TOP OF ⊚ GIVES THE FOLLOWING OUTLINE 1 ◯ 2 ⁘ 3 ◯ 4 ▢ 5 ♣	15
16	◇ IS TO ▽ AS ◸◸ IS TO 1 ◇ 2 ▽ 3 ◸ 4 ◸ 5 ◸	16
17		
18		
19		

QU. No.	DO NOT WRITE ANYTHING ON THIS PAPER.	
23	FROM  TAKE  AND THERE IS LEFT	1  2  3  4  5 
24	 WHICH OF THE FOLLOWING COMES NEXT?	1  2  3  4  5 
25	 PLACED EXACTLY ON TOP OF  GIVES THE FOLLOWING OUTLINE	1  2  3  4  5 
26	 IS TO  AS  IS TO	1  2  3  4  5 
27	 IS THE SAME AS	1  2  3  4  5 
28	FROM  TAKE  AND THERE IS LEFT	1  2  3  4  5
29	WHICH OF THE FOLLOWING COMES NEXT?	1 2 3 4 5
30	PLACED EXACTLY ON TOP OF GIVES THE FOLLOWING OUTLINE	1 2 3 4 5
31	IS TO AS IS TO	1 2 3 4 5
32	IS THE SAME AS	1 2 3 4 5
33	FROM TAKE AND THERE IS LEFT	1 2 3 4 5
34	WHICH OF THE FOLLOWING COMES NEXT?	1 2 3 4 5
35	PLACED EXACTLY ON TOP OF GIVES THE FOLLOWING OUTLINE	1 2 3 4 5
36	IS TO AS IS TO	1 2 3 4 5
37	IS THE SAME AS	1 2 3 4 5
38	FROM TAKE AND THERE IS LEFT	1 2 3 4 5
39		
40		
41		

DO NOT WRITE ANYTHING ON THIS PAPER.

		QU. Nº
45	PLACED EXACTLY ON TOP OF ○ GIVES THE FOLLOWING OUTLINE	45
46	△ IS TO ▽ AS ▽ IS TO	46
47	IS THE SAME AS	47
48	FROM ◇ TAKE ▷ AND THERE IS LEFT	48
49	WHICH OF THE FOLLOWING COMES NEXT?	49
50	○ PLACED EXACTLY ON TOP OF GIVES THE FOLLOWING OUTLINE	50
51	IS TO AS IS TO	51
52	△ IS THE SAME AS	52
53	FROM TAKE AND THERE IS LEFT	53
54	WHICH OF THE FOLLOWING COMES NEXT?	54
55	PLACED EXACTLY ON TOP OF GIVES THE FOLLOWING OUTLINE	55
56	IS TO AS IS TO	56
57	IS THE SAME AS	57
58	FROM TAKE AND THERE IS LEFT	58
59	WHICH OF THE FOLLOWING COMES NEXT?	59
60	PLACED EXACTLY ON TOP OF GIVES THE FOLLOWING	60
61	IS TO	

DIVERGENT PRODUCTION BY A PUBLIC SCHOOL BOY
(ELABORATION TEST) 12 YEARS OLD

A. aco

Mun

Pot flawa

hi Cap

box

Divergence (Private School)
(11 Years Old)

mango

tree

television

Divergence Production (Private Sch)
(11.5Years Old)

Stairs

head

fingers

Kite

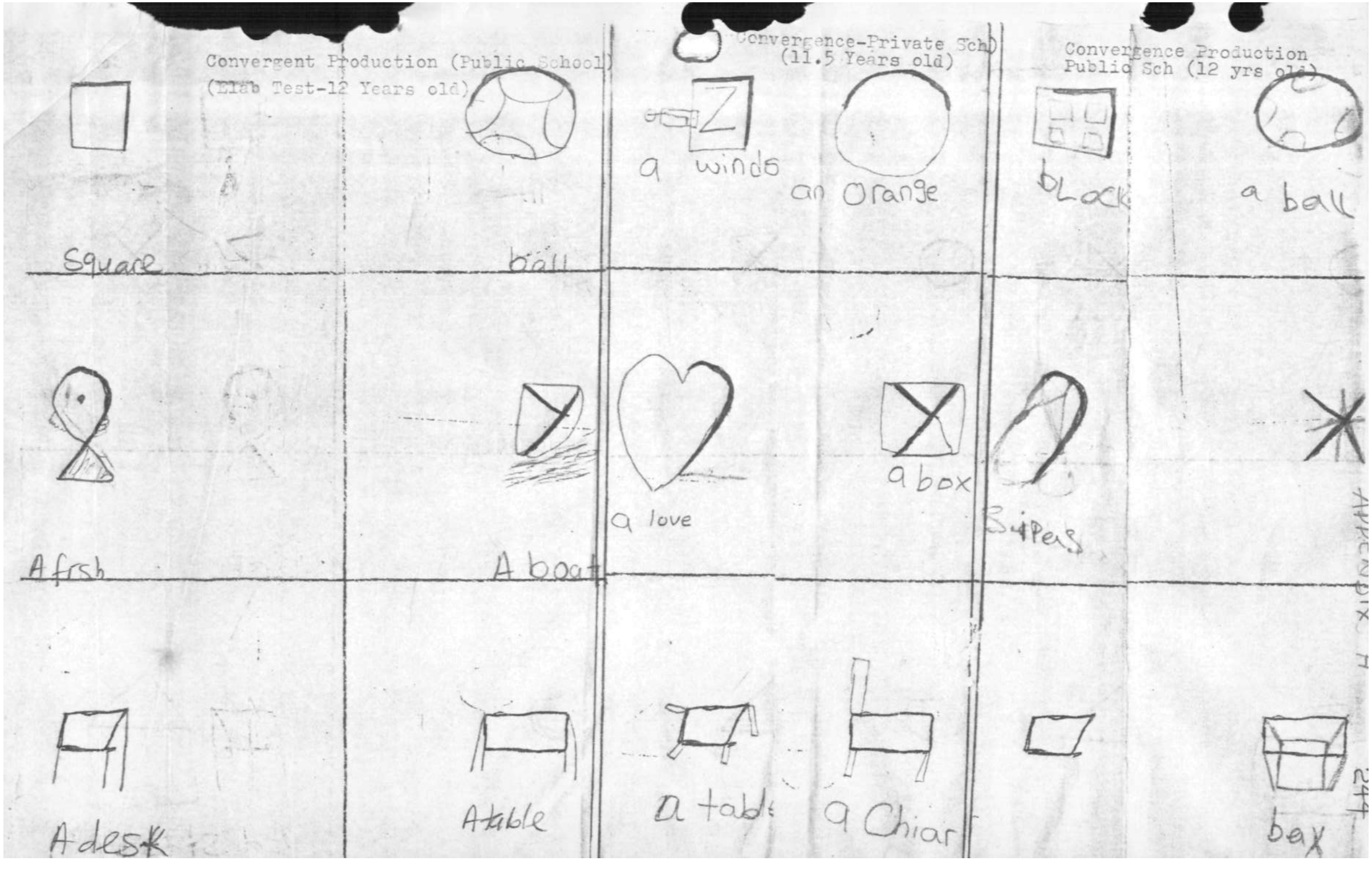
box

Train

Convergent Production (Public School)
(Lab Test-12 Years old)

Convergence-Private Sch
(11.5 Years old)

Convergence Production
Public Sch (12 yrs old)



APPENDIX I

CHARACTERISTIC CONVERGENT PRODUCTION
(PUBLIC SCHOOL- 12 YEARS OLD)

A BROOM

244

le use Broom for Swepping the floor
use Broom for killed the cockroach

A TYPICAL DIVERGENT PRODUCTION (BOYS TEST
PRIVATE SCHOOL PUPIL

(12 Years) A BROOM

① We use it for to sweeping our room
② We use it for sweeping our surrounding
③ We use it for sweeping the office.
④ We use it for sweeping our classroom
⑤ We use it for sweeping the hut.
⑥ We use it for sweeping the flor
⑦ We use it for sweeping our toilet
⑧ We use it for sweeping our mat
⑨ We use it for washing our house
⑩ We use it for killing insect
⑪ We use it for driving flies

A STONE

use Stone for ~~for~~ throw to som
use Stone for

A STONE

① We use it for Stoning people
② We use it for arranging fire
③ We use it for Stoning animals
④ We use it for Stoning birds
⑤ We use it for Stoning snakes
⑥ We use it for Counting..
⑦ We use it for ~~Standing~~ Standing ~~watmeke~~.
⑧ We use it for sitting ~~understand~~
⑨ We use it for playing ball.
⑩ We use it for repairing Chairs
⑪ We use it for repairing tables

FIRE

le use fire for cooking
le use fire for ~~burning~~ burning

FIRE

① We use it for Cooking our food.
② We use it for boiling water
③ ~~We use it for washing our body~~
④ We use it for warming our body
⑤ We use it for burning the bush
⑥ We use it for burning the ~~grass~~
⑦ We use it for burning snakes
⑧ We use it for burning trees.
⑨ We use it for warming our food.
⑩ We use it for burning animals
⑪ We use it for burning tyres
⑫ We use it for burning dirty thing.

SAMPLING FRAME OF MAIN STUDY

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	1 No. of classes	2 No of Children	3 Original sample	4 Unqualified sample	5 Main study sample	6 Boys	7 Girls
1. ABU Staff School Samaru	6	210	52	5	47	24	25
2. Army Command School	6	185	54	6	49	27	20
3. Kaura Primary School, Zaria City	3	107	28	4	24	12	12
4. Kwarbai Pri. School, Zaria City	4	138	43	4	39	20	19
5. G.R.A. Primary School, S/Gari	4	139	42	6	36	16	20
6. Jaafaru Primary School,S/Gari	3	108	32	4	28	14	14
7. Nura Hulda Primary Sch, T/Wada	3	118	26	4	22	11	11
8. LEA Primary School, T/Wada	4	130	38	6	32	14	18
Total	34	1135	315	239	277	138	139

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APPENDIX L

Item Analyses of Matching Familiar Figures Test (MFFT) Pilot Study

(Reflectivity - Impulsivity)

MFFT ITEMS	Percentage of the High Group (H) answering correctly (Top-third-percentage correct) (A)	Percentage of the Low Group (L) answering correctly (Bottom third percentage correct) (B)	Discrimination Index (Percentage Difference Between A and B)	Facility Index $\frac{A + B}{2}$
1	100	100	0	100.0*
2	90	60	30	75.0
3	85	55	30	70.0
4	90	95	05	92.5*
5	81	45	36	63.0
6	74	36	38	55.0
7	88	56	32	72.0
8	100	90	10	95 *
9	86	56	30	71.0
10	80	55	25	67.5
11	86	51	35	68.5
12	71	33	38	52.0
13	92	58	34	75.0
14	70	63	07	66.5*

Note

* MFFT items deleted from test battery. (Discrimination index, widely dispersed from 30%) Hills (1976), Mukherjee (1978) The remaining 10 items were included in the main study.

APPENDIX D

Item Analyses of the Embeded Figures Test (EFT) Pilot Study

(Field Independence - Dependence)

EFT ITEMS	Percentage of the High Group (H) answering correctly (Top-third-percentage correct) (A)	Percentage of the Low Group (L) answering correctly (Bottom-third percentage correct) (B)	Discrimination Index (Percentage Difference between A and B	Facility Index $\frac{A + B}{2}$
1	43	34	09	33.5*
2	78	35	33	56.5
3	90	63	27	76.5
4	80	44	36	62.0
5	90	60	30	75.0
6	80	45	35	62.5
7	65	28	37	46.5
8	71	38	33	54.5
9	45	21	24	33.0*
10	100	85	15	92.5*
11	85	55	30	70.0
12	78	42	36	60.0
13	88	60	28	74.0
14	100	92	08	96.0*

Note

* EFT items deleted from test battery (Discrimination index widely dispersed from 30%) Hills (1976) Mukherjee (1978) The remaining 10 items were included in the main study.