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MASTER COPY

UNIVERSITY OF SOUTHAMPTON

THE DEVELOPMENT OF TERRITORIAL DECENTRATION IN CHILDREN: A STUDY OF PIAGET'S SPATIAL STAGES IN RELATION TO THE SCHOOL GEOGRAPHY CURRICULUM IN THE REPUBLIC OF KENYA

by

JAMES LWANGA-LUKWAGO
B.A.Hons.(Geog), P.G.Dip.Ed. (U.E.A. - Makerere);
Adv.Dip.Ed. (Bristol); M.Sc.(Ed.) (Southampton)

A thesis submitted in fulfilment of the
requirements for the degree of
Doctor of Philosophy

DEPARTMENT OF EDUCATION
FACULTY OF EDUCATIONAL STUDIES

1982

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DEDICATION

I wish to dedicate this work to LUKE K. and ESTHER N. LWANGA, my beloved parents, for all they sacrificed for my continuing education; and to GEORGE W. KAJJULE-SSAALONGO and JOHN BUTLER, for their instructive guardianship.

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As a continuing student of geographical education, I have greatly benefited from consulting several literary works, particularly those authored by Professor Norman J. Graves of the London University Institute of Education. I was also lucky to start my career as a teacher educator in East Africa by working with two experienced geography teacher educators, namely, Chris Skinner and Julian A.D. Treadaway, then at the National Teachers' College, Kyambogo, Kampala, Uganda. To each of the above-named and for the opportunity I have since had to emulate them, I am exceedingly grateful.

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In conclusion, I wish to absolve all those individuals and organisations mentioned above from responsibility for any omissions and/or for commission of any typographical and interpretational errors. For all these, I alone remain accountable.

J. L-L
November, 1981.

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF EDUCATIONAL STUDIES

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THE DEVELOPMENT OF TERRITORIAL DECENTRATION IN CHILDREN: A STUDY OF PIAGET'S SPATIAL STAGES IN RELATION TO THE SCHOOL GEOGRAPHY CURRICULUM IN THE REPUBLIC OF KENYA

by James Lwanga-Lukwago

This thesis makes a contribution to the study of the spatial aspects of the development of territorial decentration (DTD) in children through an investigation of Piaget's (1928, 1951) Spatial Stages in relation to curricula in school geography and in geographical education in the Republic of Kenya. The subjects were 270 (135 boys and 135 girls) Kenyan African children, aged 11 to 20 years and drawn from the alternate grades of Primary Standard VI and Secondary Forms I and III of the 7 participating schools. Ninety (90) subjects were selected from each of these 3 different regions: (1) Nairobi (urban), (2) Kiambu (semi-rural), and (3) Narok (remote rural).

The tasks administered individually to the subjects were modified versions of (1) Stoltman's (1971, 1976) Territorial Decentration Test (TDT); (2) the Three Mountains Co-ordination of Perspectives Test (SCDT); (3) Oltman's (1968) Portable Rod-and-Frame Test (PRFT); and (4) the Class Inclusion Test (CIT), using animals. Of the nine (9) a priori hypotheses, which were tested using Chi-squared, correlation and stepwise regression techniques, seven (7) were rejected and the last two (2) were accepted in their null form ($p \leq 0.05$).

The results showed that (1) though Kenyan subjects passed through the same sequence of territorial decentration stages (TDSs), or the Piagetian Spatial Stages, as observed amongst Swiss, Scottish, American and Brazilian children, the rates of progress were different. Thus, while the Kenyan subjects attained various TDSs at greater chronological ages than their counterparts in the countries named above, they entered the stages at ages earlier than those predicted in Stoltman's hypothetical model of Age-Stage Fits A, B and C; (2) the DTD improves proportionately with increasing chronological age and school grade; (3) boys and subjects from lower SESP categories are respectively more territorially decentred than girls and subjects from higher SESP categories; (4) while remote rural subjects are the most territorically decentred, followed by those in semi-rural Kiambu, the least decentred subjects are those in the urban Nairobi region; (5) space concept development is crucial in the DTD; and (6) no statistically significant relationships were found between the subjects' DTD and their standing on the FD-FI dimension of psychological differentiation and levels of operational logical class inclusion ability.

Finally, the thesis discusses some implications of the findings and suggests recommendations for further related research.

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GLOSSARY OF ABBREVIATIONS USED IN THE THESIS

ASSP	African Social Studies Programme
BER	Bureau of Educational Research, Kenyatta University College, Nairobi.
CCTV	Closed Circuit Television
CIT	Class Inclusion Test (using animals)
CPE	Certificate of Primary Education (Kenya)
DTD	Development of Territorial Decentration
EOSJ	Effectiveness of spatial judgment
FD-FID	Field-dependent and field-independent dimension of the cognitive style of psychological differentiation
IGU	International Geographical Union
JKF	Jomo Kenyatta Foundation, Nairobi.
KANU	Kenya African National Union, Kenya's sole political party.
KACE	Kenya Advanced Certificate of Education (equivalent to the Cambridge General Certificate of Education (GCE) - Advanced Level).
KCE	Kenya Certificate of Education (equivalent of the Cambridge GCE - Ordinary Level).
KIE	Kenya Institute of Education, Nairobi.
KJSE	Kenya Junior Secondary Examination
KLB	Kenya Literature Bureau, Nairobi.
KNEC	Kenya National Examinations Council
KSES	Kenya Science Equipment Scheme
KSTC	Kenya Science Teachers' College, Nairobi.
KTTC	Kenya Technical Teachers' College, Nairobi.
KUC	Kenyatta University College, Nairobi.
LSCD	Level of space concept development
NCEOP	National Committee on Educational Objectives and Policies (Chairperson: Peter J. Gachathi then Permanent Secretary, Ministry of Education, 1976)
NCST	National Council for Science and Technology, Office of the President, Nairobi.
NFER	National Foundation for Education Research in England and Wales
PEERE	Physico-eco-cultural environmental and residential experience

PRFT	Portable Rod-and-Frame Test
PTCs	Primary Teachers' Colleges (Kenya)
SCD	Space concept development
SCDT	Space Concept Development Test
SEPU	Science Equipment Production Unit (Kenya)
SES	Socio-economic status
SESP	Socio-economic status of the parent(s)
SPSS	Statistical Package for the Social Sciences
TAC(s)	Teachers Advisory Centre(s) (Kenya)
TD	Territorial Decentration
TDSs	Territorial Decentration Stage(s) I(1), II(2) and III(3)
TDT	Territorial Decentration Test
TSC	Teachers' Service Commission (Kenya)
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNICEF	United Nations International Children's Emergency Fund or United Nations Children's Fund
UON	University of Nairobi
USA	United States of America
WCOTP	World Conference of Organisations of the Teaching Profession
WHO	World Health Organisation
#6	Item Six (6) of a research test

GLOSSARY OF OPERATIONAL DEFINITIONS OF SOME KEY TERMS AND CONCEPTS USED IN THE STUDY

Accommodation = The process through which a child shows evidence of being able to modify his existing assimilated schemata, or to recognise and understand new events and objects as they occur, and of coping better with any new environmental demands (Piaget, 1970c).

Assimilation = The process through which an individual makes progressive interactive adaptations to his/her environment thereby "taking-in" new sets of information in a selective manner (Piaget, 1970c).

Cognition = One kind of biological achievement which allows the individual to interact effectively with the environment at a psychological level (Ginsburg and Opper, 1969: 14).

Cognitive Map = A person's organised representation of a part of the spatial environment (Downs and Stea, 1977: 61). Or as Oatley (December, 1974: 864) put it '"a cognitive map" is a personal understanding of the spatial inter-relations of the places and "a paper map" is in some way, but not all, a closely similar artificial equivalent....'.

Cognitive Mapping = The mental process through which people come to grips with, and comprehend, the world around them (Downs and Stea, 1977: 61).

Concepts = According to Almy (1967: 24), the psychologist regards concepts as 'systems of meanings within the mental organisation of the individual which arise as the individual generalises from his/her experience, and serve as expectancies or hypotheses for the classification of incoming information'. Concepts are formed, changed, enlarged or subdivided by a feedback process in which the ideas are continually tested in new contexts and modified accordingly (Harris, 1963: 191).

Cross-cultural psychology = The study of aspects of individual human behaviour as it develops and is displayed in a wide variety of ecological and cultural settings (Berry, 1976: 4).

Decentration = The act of extending one's territorial or spatial perspective or world progressively outwards from the centre, as opposed to the process of centration or the act of centring (Child, 1977: 122; Gove (1969) and Piaget, 1970c: 711). Decentration implies the waning of egocentricity.

Egocentricity = The tendency towards self-centredness and a general lack of perception of the concerns and feelings of others. Thus, "an egocentric subject" is one who displays an inability to distinguish between his/her own viewpoint and that of another (Garner and Plant, 1972: 80).

Environment = 'The aggregate of external conditions that influence the life of an individual or population, specifically the life of man' (Detwyler (1971: 103-104: Man's Impact on Environment, McGraw-Hill, New York)), as quoted by Cox, B. and Emery, J., in UNESCO and Graves (1975: 112).

Epistemology = The study of the origin, growth, nature, validity and extent of the individual's knowledge (Drever, 1964: 86).

Equilibration or Auto-regulation or Interactive Adaptation = The process through which the development from lower to higher orders of psycho-motor functioning in the individual takes place to ensure constant balance with his/her social and physical world, and of which intelligence or cognitive development is one form (Piaget, 1970c and 1972).

Harambee = Kenya's national motto which, literally translated from Kiswahili, means '"Let us pull together"; the slogan for "Self-help"' (Republic of Kenya, 1979a: 523).

Intelligence	=	The biological consequence of continuous interaction between the individual and his/her environment through the process of adaptation, which is itself a product of the two invariant functions of assimilation and accommodation (Eliot (1965: 5) and Dasen (1970: 1)).
Operations	=	Interiorised, schematic and reversible representational actions which rarely exist in isolation but form integral parts of organised "groups" or "systems" or "structures" which are interrelated (Flavell (1970: 165-166) and Piaget (1970c, 1972)).
Perspectivism	=	The ability to recognise that another person's point of view may be different from one's own, and to adopt that view if so required (Werner, 1948). This is what is called "decentration" in the Piagetian system.
Research Subjects	=	'The people who are being studied or who are providing the information on which the research is based' (Evans, 1978: 43); or 'the experimenting individual(s) or self(selves), the human being(s) (or animal(s)), upon whom an experiment is being performed' (Drever, 1964: 186).
Schema	=	A coherent, organised set of information or knowledge about objects, events or actions (Sigel and Cocking, 1977: 15). (Plural = Schemata or Schemas).
Territory	=	The terrestrial space occupied and used by man and other related biotic phenomena.
Territorial Decentration	=	The process through which one broadens one's centre of territorial or spatial interest from the self-centred household compound and family environments to such more decentred geo-political territories as the town, province, city, nation and world (Piaget (1928), Piaget and Weil (1951) and Stoltman (1971, 1976a).

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PREFACE

The work reported in this thesis has a multivariate pedigree. Firstly, it is a result of the experience the present writer has so far acquired mainly in East Africa and the United Kingdom as a student, school teacher, teacher educator, participant in curriculum development work and examiner in geography and geographical education. Secondly, it represents the writer's contribution towards the continuing attempts to investigate certain aspects and problems in teaching/learning in school geography and in the geographical education and training of teachers in East Africa generally and in Kenya in particular.

Thirdly, this study may be viewed as the author's response to the invitation of psychologists to geographers and geographical educationists to undertake, inter alia, the following research tasks:

a. To examine the way in which the concepts or ideas needed in geography are related to those represented in such other disciplines as mathematics, the physical sciences, language and fine arts, and the social, environmental and medical sciences (Almy, 1967: 38); and

b. To draw upon the study of psychology so as to investigate the wide range of intellectual experiences and skills found and used within geography, just as psychologists have attempted to do (Almy, op. cit., and Veness, 1972: 76).

Consequently, the 22nd International Geographical Congress held in Canada (1972) instituted a geographers' group to be responsible for furthering research in the interface between psychology and geography and under the aegis of the IGU*. One of the research problems the group identified, and with which this study is specifically concerned, was:

> .... to find out the extent to which Piaget's evaluation of children's conceptions of the relationships between territories of different sizes (for example, in Switzerland: town/city, canton and country) could be shown to be valid (or not valid) among children of other countries, and what would the findings of such studies imply for the geography curricula of the countries concerned....
>
> (Graves, N.J. in Stoltman, 1976b: v).

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* For this and other abbreviated terms used throughout the text of the thesis, reference may be made to the Glossary of Abbreviations, pages xiv-xv.

One of the most important national educational objectives for Kenya was identified and stated by the Gachathi Report as being 'the creation and promotion of national unity and international consciousness' (See ROK, 1976a: 3-5). This report further called for the development of appropriate educational programmes through which such objectives as the above-named could be developed and inculcated amongst the citizens of Kenya. A survey of the primary and secondary school curricula in geography in Kenya revealed that some of this subject's aims are clearly geared towards the fulfilment of, inter alia, the objective stated above. For the specific examples and detailed discussion of these aims and other relevant issues, reference may be made to Chapter II.3, pages 59-65, of this thesis. The most important observation made from this survey was that the concepts of "territory" and "territorial decentration" seem to underly much of the theory and practice in geography. Thus, fourthly, this study of the development of territorial decentration (DTD) in Kenyan African children represents a specific attempt to examine one of the various ways in which geography teaching/learning in Kenya may contribute towards the reinforcement of the concept of a nation (Graves, 1975: 82), and the promotion of national unity and international consciousness or understanding.

Finally, this study represents the first attempt to replicate and extend cross-culturally the research on the DTD to a sample of Kenyan African children. While the original studies were undertaken in Switzerland by Piaget (1928) and Piaget and Weil (1951), subsequent related investigations have since been carried out in Scotland and parts of Western Europe by Jahoda (1963a and b, 1964), Jahoda and Tajfel (1965), Carnie (1966, 1972) and Marsh (1966); in North America by Stoltman (1971, 1972, 1976); and in Brazil by Oliviera (1976).

In terms of organisational structure, the work presented in the thesis broadly falls into two main sections, namely the theoretical and experimental parts. While the details are covered in the text of the thesis, the main content areas of these parts are briefly outlined below.

Part I is comprised of Chapters I to III. To begin with, Chapter I presents a critical overview of Piaget's invariant stage-dependent theory of the development of the structures of human thought. This is done to provide a basis for understanding the general conceptual framework

within which this study is being undertaken. Chapter II is concerned with a consideration of the historical and evolutionary perspectives of the concept of territorial decentration (TD). This is done through a critical review of pertinent research literature published from about 1928 to 1980. In addition to offering some operational definitions of some of the key terms and concepts used, this chapter outlines and states the problem, purposes, nature of and limitations to the scope, of the investigation.

The final chapter of Part I concentrates on outlining the rationale of the research and of the research hypotheses. Thus, further to making a number of predictions about the way in which the factors listed below are likely to influence the DTD, this third chapter outlines the main theoretical reasons for selecting each of these factors for consideration in the study. The independent variable factors studied are the subjects' age, grade or year of schooling, sex differences, SESP, PEERE, LSCD, FD-FID of cognitive styles of psychological differentiation, and their level of operational logical class inclusion ability. As a result, nine (9) a priori hypotheses are stated in null form for eventual testing in the experimental phase of the study.

Part II of the thesis focusses on the consideration of the experimental aspects of the research. It consists of Chapters IV to VIII.

Chapter IV provides a basis for understanding the geographical and cross-cultural perspectives within which this experimental study took place through a descriptive outline of its setting in Kenya. The main aspects discussed in this respect include, inter alia: the country's locational, areal, ecological, and socio-economic features; and the historical, organisational and developmental aspects of her education system, with particular reference to the formal education sector from which the research subjects were drawn. The second section on research methodology descriptively outlines the general design and organisation of the study, including a re-statement of the experimental independent and dependent variables. In addition to describing the characteristics of the research sample, a consideration of the theoretical and practical aspects of the sampling procedure is also undertaken.

The process and procedures of instrumentation through which data for this research were collected form the content of Chapter V. The main elements described in this chapter are the background questionnaire and interview schedule; procedures for selecting the research instruments; specific tasks and materials used to operationalise the experimental criteria under investigation; and procedures for administering and scoring each of the experimental tasks. Additionally, the following four (4) tasks, which were adopted and used in the study, mutatis mutandis, are then described: TDT, which was used as the main criterion instrument for the research and has 4 Sub-tests, SCDT, PRFT and CIT.

Chapter VI is concerned with the presentation, analysis, interpretation and discussion of experimental results, and with the testing of the research hypotheses. On the basis of the findings and conclusions made in this chapter, the main implications of the research for Kenya's curricula in geography and geographical education are discussed in Chapter VII. Furthermore, this chapter outlines the main recommendations which suggested themselves for further investigation in future related research.

The final chapter in Part II of the thesis summarises the work undertaken in this research. This eighth chapter ends by outlining the distinctiveness of the study in relation to previous pertinent investigations.

PART I

THEORETICAL CONSIDERATIONS OF THE STUDY

CHAPTER		PAGE
I	A General Outline of Piaget's Theory of Cognitive Development	2
II	The Historical and Evolutionary Perspectives of the Concept of Territorial Decentration, and Statements of the Problem, Purposes, Nature of and Limitations to the Scope, of the Study	53
III	Statements of Rationale of the Research and of the Research Hypotheses	123

CHAPTER I

A GENERAL OUTLINE OF PIAGET'S THEORY OF COGNITIVE DEVELOPMENT

I.1 Introduction

The interface between the disciplines of psychology, geography and geographical education[1*] constitutes the general field of knowledge within which the present investigation is undertaken. However, this study's conceptual or theoretical framework is derived mainly from the theory and research of the late Professor Jean Piaget (1896-1980)[2], the Swiss genetic epistemologist and genetic psychologist. The aim of this first chapter is to present a general and brief outline of Piaget's global stage theory of the development of the structures of human thought, or the so-called "cognitive developmental theory". This general overview will include, inter alia, a consideration of the following aspects: the main characteristics of Piaget's global stage theory; the major factors influencing the sequence of the development of the structures of human thought; the four major global stages of the development of human thought, postulated by Piaget; and some critical observations about Piagetian theory. Throughout this survey, an attempt will be made to examine some of the relevant information which has emerged from the studies undertaken so far in the field of cross-cultural Piagetian psychology. This examination will help to highlight the major trends in the application of Piaget's theory, and also to illustrate the various issues under discussion within the general framework of Piaget's theory. This general outline will thus help to provide the basis for an operational understanding of the origins and evolution of the concept of territorial decentration[3], or the waning of spatial egocentricity, with which the present study is specifically concerned.

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* Throughout this thesis, superscript numbers are used to indicate notes and references which can be found at the end of each chapter. Thus, Note I.1 refers to Note 1 which is at the end of the text of Chapter I.

I.2 The Main Characteristics of Piaget's Cognitive Developmental Theory

At the outset, it is important to note that in his attempts to contribute to an understanding of the origin and development of the structures of human thought, Piaget (1928/1976[4]; 1936/1977[5]; 1947/1950[6]; 1970c; and 1972)* produced a number of theories and promulgated several laws which respectively help to explain and govern the basic processes underlying the development of human intelligence[7] and concept formation. In focussing attention on the investigation of how human cognition evolves from infancy to later stages in adolescence and adulthood, and by using a genetic approach, which is concerned with tracing how the higher processes evolve from biological mechanisms rooted in the development of an individual's nervous system (ontogenesis), Piaget was thus particularly interested in studying, inter alia, the origins, growth, nature, validity and extent of an individual's knowledge (epistemology[8]). He thereby evolved what is now known as "genetic epistemology" or "genetic psychology"[9] and founded the "Geneva school" of genetic and cognitive developmental psychology. What, then, are the main characteristics of his cognitive developmental theory?

According to Piaget (1936/77; 1947/50), though a baby, in the first instance, responds to his immediate surroundings by reflex activity, without acquiring the same activity, he later learns gradually to co-ordinate his motor, cognitive and perceptual functions, and to organise his actions into some distinct behavioural patterns or sequences. Piaget called these flexible, mutually-dependent and reversible behavioural patterns, for whose formation continuous action by the individual concerned is essential, "schemata" or "schemas"[10] ("schema" is the singular form). In short, a schema is an active organisation of actions. Piaget identified three types of schemata, which are the motor, cognitive and representational schemata. According to him, whereas both

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* The authors, dates, titles, publishers, and places of publication of all the literary works cited thus throughout the text of this thesis can be found in the Bibliography, pages 373 to 435.

cognitive and motor schemata operate as integrated patterns which tend to become habitual, in "motor schemata", individual responses are fused into an integrated pattern while "cognitive schemata" are more like integrated patterns of concepts.

As the actions forming the motor and cognitive schemata gradually become replaced by such symbols as words and numbers, they then become, according to Piaget, "representational schemata". When the child begins to represent his world mentally, using memory to recall images of the original experience and perceptual patterns, and symbolic language, he is said to have attained "internalised imitation" or "imagery". In a nutshell, such a child is capable of "internalising" as many experiences as he encounters. A progressive increase in the use of symbolic language in time systematically frees the child from the need to manipulate raw reality so as to form schemata. The child thereafter begins to develop "logical" thinking and he thus becomes able to reason using representations of the facts. This ability to carry out activities in the child's imagination was termed an "operation" by Piaget. Put differently, "operations" are interiorised and reversible actions which rarely exist in isolation but form "groups" or "systems", as will be explained later. Thus, the child's ability to carry out mental operations determines his growth to intellectual maturity.

As Piaget observed, the child strives constantly to perform a series of psycho-motor activities which help him to manipulate, and maintain a dynamic equilibrium with, his immediate environment. In Piagetian language, this process, through which the development from lower to higher orders of psycho-motor functioning in the individual takes place to ensure constant balance with his social and physical world, is called "interactive adaptation" or "equilibration". This process of interactive adaptation, of which intelligence or cognitive development is one form, and which develops through a complex interaction between the child or organism and his/its surroundings, is the motivation for all biological and psychological development. Or, as Ginsburg and Opper (1969: 14[11]) put it, cognition or intelligence 'is one kind of biological achievement which allows the individual to interact effectively

with the environment at a psychological level'. To this extent, therefore, Piaget's theory can be referred to as a "biological-experiential and interactionist model" of understanding the development of the structures of human thought.

Piaget's genetic psychological theory further holds that while cognitive growth derives from the organism's biological nature, another process of structuring and restructuring existing schemata to "take-in" any additional in-coming motor, cognitive and perceptual schemata also takes place constantly. The additional schemata either become directed to similar and/or parallel structures, or they can be incorporated to form new schemata, or further still, they can be integrated into the individual's existing schemata. This process, through which an individual makes progressive interactive adaptations to his environment, thereby "taking-in" new sets of information in a selective manner, was termed "assimilation" by Piaget.

Closely linked, and taking place concurrently, with assimilation is another important process that Piaget called "accommodation". This process is said to be experienced if and when the child shows evidence of being able to modify or alter his existing assimilated schemata, or to recognise and understand new events and objects as they occur, so that he is thereafter able to cope better with any new environmental demands. Thus, on the one hand, assimilation and accommodation, which exist in all human activity, are the means by which knowledge is constructed mentally. On the other hand, interactive adaptation, which is a continuous and ever-active function that ensures the construction of knowledge and the transition from any state of temporary equilibrium to a succeeding one, can be viewed as the equilibration of assimilation and accommodation. According to Piagetian theory, the three processes of assimilation, accommodation and equilibration operate inseparably, and together, they are crucial to the cognitive growth of an individual. Through them, and by acting on objects, events and people, the child learns to know, and to construct more knowledge of, the socio-physical world around him.

I.3 The Main Factors Influencing the Sequence of the Development of Thought in the Piagetian System

According to Piagetian theory, there are four main interrelated factors which influence and/or explain the sequence of an individual's cognitive development. They are: maturation or heredity or biological factors; acquired experience (including simple sensori-motor exercise, physical and logico-mathematical or reasoning experiences); the action of the social environment or general socialisation (including cultural, educational and language differences); and equilibration or autoregulation. A brief outline of each of these four factors follows below.

Firstly, "maturation" or heredity or the growth of the biological structure in the individual, or according to Drever (1964: 165): "the process of growth and development itself, as contrasted with the learning process", helps to account for the regularity and inevitability of Piaget's sequential stages of cognitive development (Child, 1977: 117). Arguing that intelligence, logic, and ideas are neither innate nor programmed, Piaget maintains that maturational effects consist basically of organising new possibilities for an individual's cognitive development, or of giving the individual access to structures which could not be evolved before these possibilities occurred. Nevertheless, between the possibilities and actualisation, there must intervene a set of such other factors as exercise, experience, and social interaction (Piaget, 1970c: 719-720). In this context, therefore, as a child matures, he should be able to become more mobile and sociable and, by so doing, to extend his contact and interaction with the environmental world around him. As Sigel and Cocking (1977: 19) contend, amongst the biological factors which are crucial for the development of intelligence, Piaget particularly identified the role of factors which contribute to the development of an entirely "new" organism (epigenetic development) so much so that the development of that organism or child is not just one of growth, but proceeds toward adult structures not seen in the embryo.

The second important factor identified by Piaget is "acquired experience", and it has three categories or meanings. These are simple sensori-motor exercise, experience of the physical world, and reasoning or

logico-mathematical experience. These types of direct experience, which are acquired through contacts with objects in the external, physical environment, and through the interactive adaptation processes, or the constructive activities of the subject, offer an individual various opportunities for obtaining knowledge about the real objects and the events taking place, in the environment surrounding him. This individual is also enabled to develop his underlying structure or actual level of reasoning or, in Piagetian terms, "competence". The child thus gradually develops the ability to reason about the validity of the experiences he is having and to work out interactive relationships between himself and such objects and/or events as occur in his environment. Thus, according to Piaget, a child begins by acquiring the knowledge and understanding of the "permanence" of objects, and gradually follows this by revealing the abilities:

a. to put objects into a one-to-one correspondence;
b. to seriate or order objects;
c. to use addition, subtraction or logical multiplication; and
d. to use the logical structure of classification or the "quantification of class inclusion".

"Simple sensori-motor exercise", which is the first category of experience, involves the presence of objects on which action is exerted but does not necessarily imply that any knowledge will be extracted from these objects (Piaget, 1970c: 720). This exercise affects positively the consolidation of a reflex, or of such a group of complex reflexes as sucking, and the intellectual operations which, though not derived from the objects themselves, can be applied to the same objects. There are two opposite poles of activity in exercise. Firstly, the pole of "accommodation" to the object constitutes the only source of the acquisition of information based on the object's properties. The second one is the pole of "functional assimilation", or the consolidation of new exogenous information through active repetition of the subject's activity. As Piaget (op. cit.: 720) explains, in the functional assimilation perspective, 'exercise is predominantly a factor of "equilibration" or "auto-regulation"' in the sense that 'it has to do with structurations dependent on the subject's activity more than

with an increase in the knowledge of the external environment'.

"Physical experience of the world", the second category of experience, consists of those activities which involve the extraction of information from the physical objects themselves through a simple process of abstraction. Through abstraction, newly-discovered properties become dissociated from any others while these others are disregarded. For example, Piaget (op. cit.: 721) points out that processes of physical experience enable a child to discover the property of weight while disregarding an object's colour, or to discover that with objects of the same nature, their weight is greater as their volume increases.

The third category, which is also the most important type of interaction with the environment at all levels of cognitive development where logical deduction or computation is still impossible, is "logico-mathematical experience". In this type of experience, knowledge is not derived from the physical properties of the objects, as explained above, but from the properties of actions that are exerted on the same objects. This is so mainly because the knowledge so acquired seems to consist of 'discovering by manipulating objects, properties introduced by action which did not belong to the objects before these actions' (Piaget, op. cit.: 721). For instance, a child may arrange stones (or beans) in a straight line, and/or circle, and, on counting them from left to right and vice-versa, discover experimentally that they are not only the same number but also that their sum is independent of order. Thus, this child will have discovered a new and important property of number, which is a relation, between the actions of putting the objects in a certain order, joining them together and counting the same objects, but not a property belonging to the objects (stones or beans) themselves. Therefore, and in agreement with Dasen and Heron (1980: 6)[12], such a logico-mathematical experience is expected to be independent of the environment.

"The action of the social environment", to the discussion of which Piaget (1947/50: 156-166) devoted a whole chapter, was considered by Piaget to be the third main factor influencing cognitive development. In comparative terms, Piaget (1947/50: 156) contended thus:

> Society, even more, in a sense, than the physical environment, changes the very structure of the individual, because it not only compels him to recognise facts, but also provides him with a ready-made system of signs, which modify his thought; it presents him with new values and it imposes on him an infinite series of obligations. It is therefore quite evident that social life affects intelligence through the three media of language (signs), the content of interaction (intellectual values), and rules imposed on thought (collective logical or pre-logical norms).

Emphasising this view, and as Dasen and Heron (op. cit.: 6) maintained later, Piaget (1970c: 721-722) contended that such factors as cultural, linguistic and educational differences can be expected to accelerate or retard the average chronological ages at which the sequential developmental stages, which will be discussed later in this chapter, are attained, but not the operations themselves. While giving credit to language for the part it plays in the interiorisation of action into representation and thought, Piaget (ibid.: 722) also pointed out the relative importance of the symbolic or semiotic instruments of representation, of which language is only a part. Hence, the additional need to consider the relative significance of such instruments of representation as deferred imitation, which constitutes the transition between the sensori-motor and semiotic functions, mental imagery or interiorised imitation, symbolic games or games of imagination and drawing or graphical imitation. He also argued that 'the origin of logical operations is both deeper than and genetically prior to language' and thus, 'the latter (language) does not seem to be the motor of operational evolution but rather an instrument in the service of intelligence itself'.

The fourth fundamental factor, and one that complements the three classical factors described above in helping to explain cognitive development, is "equilibration" or "auto-regulation". Equilibration is 'a set of active reactions of the subject to external disturbances, which can be effective, or anticipated, to varying degrees' (Piaget, ibid.: 725). It is a progressive process through which the other three inter-dependent but heterogeneous factors are organised and co-ordinated in some

relation of mutual equilibrium to form a consistent and non-contradictory "totality", in other words, the operational structures of the integrated whole (structure opératoire d'ensemble) (Piaget, ibid.: 722). The structures specific to intelligence are "operations" (or 'mental abilities for carrying out activities in one's imagination' - Child, 1977: 119) involving such interiorised and reversible actions as addition, set-theoric union, logical multiplication or composition of a multiplicity of classes or relations considered simultaneously. As Piaget (ibid.: 723) contends, these structures have a very natural and spontaneous development in the child's thought, as will be outlined later. According to Hart and Moore (1973: 257), the equilibration process, or adaptation, is an ever-active function that assures the construction of knowledge and the transition from any state of temporary equilibrium to a succeeding one. Nevertheless, the growth of knowledge is largely due to the conflict between structures and events, and the imbalance between what the individual already knows and new experiences. This discrepancy, which Piaget termed "disequilibrium", is gradually resolved by the individual through the two processes of assimilation and accommodation. Thus, and as noted earlier, the factor of equilibration is essential not only for maintaining assimilation and accommodation in constant balance, but also for promoting in an individual a smooth transition from one stage of intellectual development to another.

The foregoing outline of the main factors influencing the sequence of the development of the structures of human thought in the Piagetian system forms a basis for the consideration of the main periods and characteristics of Piaget's global stages of intellectual development. However, before this consideration is undertaken, it is felt essential to summarise the main criteria which Piaget used to define and determine each global developmental stage in his theory. These criteria fall into two major categories: general and specific.

In general terms, to begin with, Piaget's theory of stages can be described as:

a. "genetic" in approach, because the origins of higher mental processes are seen to be those biological mechanisms which are

entrenched in the development of an individual's nervous system;

b. "maturational" in so far as the processes of concept formation follow an invariant sequence, through a number of distinct stages which emerge during specific mental age ranges, despite some overlapping in chronological age ranges;

c. "hierarchical" because all the stages are organised in a fixed, invariant order of succession, and an individual has to pass through each preceding stage before he acquires the characteristics of a succeeding one; and

d. "equilibrational" in that each stage is a step in a developmental progression which is realised in successive degrees (to maintain the processes of assimilation and accommodation in constant balance).

In specific terms, the following criteria are considered essential for distinguishing one developmental stage from another:

i. "qualitative differentiation" because each stage is qualitatively different from the one preceding, or succeeding, it;

ii. "integration" in that each stage integrates the acquisitions or structures of all the previous stages, instead of simply substituting for, or adding to, them;

iii. "consolidation" since each stage involves aspects of the consolidation of achievements of earlier behaviour, and aspects of preparation for behaviour at the following level; and

iv. "co-ordination" because each stage is a co-ordinated whole by virtue of ties of implication, reciprocity and reversibility: any behaviour which can be enacted in one direction must be able to be systematically enacted in the opposite order (Hart and Moore, 1973: 259).

I.4 Piaget's Global Stages of the Development of Intelligence

The present writer's attempt to search for a working model based on Piaget's theory revealed that whereas Piaget himself seems to have identified four major stages, or the so-called "global stages", of the development of the structures of thought (Piaget, 1947/50: 87-115,

123-129, 129-139, 139-147 and 147-150; Piaget, 1970c: 710-712), some workers have tended to extend these original stages to become five (for example, Stones, 1966: 132-138). Nevertheless, and as presented schematically in Table I.1, pages 13 to 15, Piaget's four main global, sub-stages, and their main operational characteristics can be outlined as follows.

I: The Sensori-motor or Active Stage (Birth (0) - 2 years of mental age):

During this first major period of active or sensori-motor intelligence, the child's understanding of the world around him is so restricted that it does not go beyond those properties of objects and events which arise directly from his actions relating to the same actions. The starting point for the developmental sequence is the child's motor systems which seem to underpin its reflex activities. While the child may have a practical knowledge of the way things behave when he handles them, he may, however, have no concept of why they behave as they do. His thought is locked in his own sensori-motor record which is unique to him, and, while his knowledge is private and touched by the experience of others, he has no concept of public knowledge which might be conveyed to him through language.

Though Piaget (1970c: 711) identified two main sub-periods and characteristic operational activities, namely: (a) centralisation on the subject's own body (0-7 or 9 months), and (b) objectivisation and spatialisation of schemes of practical intelligence (7 or 9 months - 1½ or 2 years), his earlier and more detailed work (Piaget, 1936/77) covers six sub-stages of sensori-motor intelligence.[13] Briefly, these sub-stages, with their corresponding approximate mental age ranges shown in brackets, are:

Sub-stage 1 (0-1 month) which is characterised by the child's use, and practical adaptations, of reflexes, or activities which are not acquired, like sucking (Piaget, 1936/77: 35-60);
Sub-stage 2 (1-4 months) which consists in the child making the first acquired and primary circular reactions (finger sucking); converting reflexes to conditioned responses; repetition; and building up

TABLE I.1

A Schematic Outline of Piaget's Global Stages of the Development of Intelligence*

Stage and/or Sub-stage	Period and/or Sub-period	Mental Age Range (in months and years)	Form of Intelligence Developed	Main Characteristic Activities and/or Operations
I	SENSORI-MOTOR	Birth (0)-1½/2 years	Sensori-motor or Active Intelligence	Use, and practical adaptations, of reflexes; primary circular reactions; conversion of reflexes to conditioned responses; repetition; construction of schemata. Secondary circular reactions; more discriminations and modifications (accommodation and organisation of schemata; advent of recognitory assimilation and development of system of meanings. Expansion and co-ordination of secondary schemata; emergence of signs of mental representation (adaptive recognition). Tertiary circular reactions; inventive intelligence; concept of object permanency; and development of sensori-motor symbolic or semiotic representational activity (mental imagery, symbolic games, graphical imitation or drawing, and deferred imitation); etc.
(Sub-stages 1 - 6)	a. Centration on subject's own body	0 - 7/9 months		
	b. Objectivisation and spatialisation of schemes of practical intelligence	7/9 months-1½/2 years		
II	PRE-OPERATIONAL	1½/2 - 7 years	Representational Intelligence	Increased semiotic representation of reality; egocentric speech and behaviour; formation of pre-concepts; transductive thinking and reasoning;
(2 Sub-stages)	a. Pre-conceptual or Transductive	2 - 4 years		

TABLE I.1 continued

Stage and/or Sub-stage	Period and/or Sub-period	Mental Age Range (in months and years)	Form of Intelligence Developed	Main Characteristic Activities and/or Operations
	b. Intuitive	4 - 7 years		Use of juxtaposition or syncretism in explaining problems. Development of directional functions; General lack of conservation and reversibility operations results in intuitive thought which impinges on "centring"; etc.
III	CONCRETE OPERATIONS or LATENCY	7-11/17½ years	Concrete Operational Thought	Development of first-order or elementary operational groupings (combining, dissociating, ordering, setting up correspondences, classification, seriation, substitution, number ability, and transitive relations) begins. Increased ability to perform conservation and reversibility tasks leads to better differentiation and coordination of different perspectives independent of oneself (decentration). The child is still incapable of hypothetico-deductive thinking and reasoning but he relies on "making assumptive realities"; etc.
IV	FORMAL or PROPOSITIONAL OPERATIONS	11/11½ years-15 years	Propositional or Formal Operational Thought	Increased development, understanding and use of symbolic concepts, and secondary logico-mathematical systems (classifying all possible classifications, etc); manipulation of
(2 Sub-stages)	a. Organisational			

TABLE I.1 continued

Stage and/or Sub-stage	Period and/or Sub-period	Mental Age Range (in months and years)	Form of Intelligence Developed	Main Characteristic Activities and/or Operations
	b. Achievement of the general combinatory and second-order logico-mathematical operational groupings			propositional operations (implications, incompatibilities, and adjunctions). Increasing decentration frees the adolescent from concrete operational modes of thought and behaviour; the thought and reasoning process becomes abstract and oriented towards logical justification and proof - the adolescent is capable of abstract, hypothetico-deductive thinking and reasoning about the objects, events and situations in the environment around him (propositional or formal operational thought), but he may not always use or display them in every case.

* For a detailed discussion of the elements outlined in this table, reference should be made to Section I.4 of Chapter I, pages 10 to 25.

schemata or distinct, organised patterns of active behaviour (for example, seeking mother's nipple, and grasping objects in contact with palm, vision, phonation and hearing) (Piaget, 1936/77: 66-166);
Sub-stage 3 (4-7 months) which is characterised by secondary circular reactions; extension outside of the baby's body; more discriminations and modifications; or accommodation and organisation of the schemata; and the beginning of the understanding of the "wholeness" of objects or "recognitory assimilation and the development of a system of meanings" (Piaget, 1936/77: 175-236);
Sub-stage 4 (7-12 months) which consists of the expansion of, and co-ordination of secondary schemata, and their application to new situations in an experimental way; and gradual emergence of signs of "mental" representation in adaptive recognition. This recognition of the object occurs by means of a repetition of the motor activity normally used on the object (Piaget, 1936/77: 237-293);
Sub-stage 5 (1-1½ years) which is characterised by the occurrence of: tertiary circular reactions, for example, doing things in anticipation of other things happening; more deliberate use of accommodation in active exploration, or experimentation, to discover new means (inventive intelligence); and the concept of the permanent object (the notion that a toy dog remains one even if it is hidden for a while) (Piaget, 1936/77: 194-367); and, finally,
Sub-stage 6 (1½-2 years), in which exploration of the environment and the invention of new means through mental combinations are the chief activities; complex schemata become clearly intentional and experimental; anticipatory and deliberate problem-solving behaviour develops further. While symbolic or semiotic representational activity remains basically a sensori-motor operation, it is significant enough to enable "mental experience" to succeed actual experimentation and assimilatory activity to be pursued and purified on a new plane' - page 389 (Piaget, 1936/77: 368-395).

The continued use of symbols and signs or symbolic representation through repeated imitation gradually becomes differentiated and internalised (interiorised) in images (a "semiotic function"). As Dasen and Heron (1980: 6-7) contend, and as already noted briefly on pages 9 - 10 above, the occurrence of such semiotic instruments of representation

of objects and events as mental imagery or interiorised imitation, symbolic games, graphical imitation or drawing and deferred imitation make possible the acquisition of language, which is also part of the semiotic function. The emergence of these semiotic operations signals the beginning of the second stage of representational intelligence whose development takes place during the succeeding pre-operational period. However, the individual child's progress towards attaining the characteristics of this second stage depends on his ability to control his co-ordination of actions (equilibration) or "shifts of orientation" and to develop some of the above-named logical operations.

II: The Pre-operational Thought Stage (2-7 years):

The pre-operational stage of thought is characterised by the development of representational intelligence, which is expressed in terms of activities like symbolic behaviour and imitative play, and lasts from 2 to 7 years of mental age. It is divided into the following two sub-periods or sub-stages:

II.1: The Pre-conceptual or Transductive Sub-stage (2-4 years):

This sub-period sees the start of the transition from sensori-motor intelligence to operational thought. It signifies the change from overt acts of the sensori-motor stage to the interiorised or inner symbolic manipulations of reality. In this process of transition, semiotic representation of the real objects and events of the world around the child is very important. This representation takes the form of some of the following operations: imagery and expressive movement, imitative play using dolls, deferred imitation, reproduction - drawing and modelling, and simple language. During this stage, the child's thought, speech and behaviour are predominantly egocentric; he can neither view objects or events from another person's point of view nor can he appreciate the fact that if he and another person are looking at an object from different perspectives, the two views would be different. The child thus lacks the ability to co-ordinate perspectives spatially and perceptually. Viewed in operational terms of this research, to which the "concept of egocentricity" is partly central, and as will be discussed in greater detail in Chapter II, an "egocentric subject

or person" is one who so failed to develop the formal notion or concept of the relevant correct territorial relationships that he/she was classified in Territorial Decentration Stage 1 (TDS.1) on the basis of his/her performance in this study's main criterion instrument: the Territorial Decentration Test (TDT).

The period is called "pre-conceptual" because the child uses words in a private and personal way; he is unable to formulate concepts in the same way as older children and adults do. He has no idea of the inclusive nature of concepts, and as a result, his words tend to refer to individual concepts and classes indiscriminately and interchangeably. Thus, for example, if a child sees insects of the same species in the garden in two different places, they are the same insects; or using any one of such characteristics as voice or clothing or features, a child may form the pre-concept "all men are daddies, and/or all women are mummies". In other words, pre-concepts can be expressed thus: "If A occurs with B once, therefore, A occurs with B always". Piaget (1970c: 712) called this "qualitative identity (a=a)". Since he can think and feel, the child expects inanimate objects to be able to do the same; hence, for example, the practice of talking to dolls.

As the child tends to explain events and situations he encounters neither deductively (whereby generalisations are used to describe particular examples) nor inductively (whereby the formation of generalisations is based on abstraction and discrimination of the characteristics of objects or situations or events), he is thus said to be "reasoning transductively". Therefore, the child reasons by going from one particular stand-point to another particular instance to form such pre-concepts as those named above. Another way in which the child may explain events is that of juxtaposition, expressed in the following statement: "since two dynamic events (A and B) are readily apparent, therefore, the one (A) causes the other (B)". Finally, the child may explain events by chaining them so that one (A) is viewed as being responsible for causing the next (B) while (B) causes the next (C), very often giving a circular result. Piaget termed this mode of thought "syncretism".

According to Piaget, this sub-period is also characterised by the development of 'directional functions (fonctions orientées), or mappings, wherein: $y = f(x)$, with unity of the value $f(x)$ for (x)'. These functions are "one-way oriented" towards the goal and while their orientation helps to explain the importance of the concept of order at this stage, that orientation is the source of systematic distortions like: "longer" being understood as "going farther", or the estimation of a quantity of water by taking only its level into account (Piaget, 1970c: 712; Piaget, 1947/1950: 123-129).

II.2: The Intuitive Sub-stage (4-7 years) (Piaget, 1947/50: 129-139; Piaget, 1970c: 711-712):

The increasing physical growth and use of language, and eventually the starting of formal schooling all tend to result in the child's involvement in more social interaction. Increased social interaction results in the child's personal and private use of symbols being shredded away, as he is gradually compelled to share with older children, adolescents and adults a communal understanding and use of concepts.

During this stage, judgment in the child remains basically faulty because certain essential operations are slow to develop. The most important amongst these operations are reversibility (watching a sequence of acts and then being able to reverse that sequence mentally, and restoring the status quo afterwards), and conservation (the ability to realise that such properties as quantity, number, length and amount remain invariant in the face of certain transformations, for example, being displaced spatially or sectioned. Since the child tends to form ideas impressionistically, basing these ideas upon superficial perceptions of his environment, he is said to be thinking and behaving intuitively. There are two main results of such behaviour. Firstly, the child's reasoning tends to be governed by egocentric perception, whereby the same child "centres" on one aspect of the situation or object (usually the most dominant) at the expense of any other important compensatory aspects. Hence, Piaget's term of "centring", which refers to this phenomenon of the child being able to grasp only one relationship at a time. The second result is that the child fails to achieve

conservation of continuous (water or plasticine) and discontinuous (beads or pebbles) quantity, number, and other properties named above.

One of the most important requirements for attaining conservation, an operation which is crucial for the development of reasoning ability at the succeeding concrete operational stage, is the acquisition of the concept of reversibility by the child. The attainment of reversibility is in turn mainly dependant upon the achievement of "decentration"[14] in the child's thought processes and behavioural patterns. This same observation was made aptly by Child (1977: 124) when he concluded that:

> ...reversibility is a central skill which frees the child from intuitive impressions, enabling him to appreciate the invariance of materials undergoing a change in physical dimensions without changes in total quantity (Child, 1977: 124).

The development of conservation in the child generally starts during the intuitive sub-stage of the period of pre-operational thought, and falls in three sub-stages, namely:

Conservation Sub-stage I (0-5 years): This sub-period is characterised by a general absence of all forms of conservation due to lack of reversibility, and to the child's inability to "decentre" from one dominant aspect of spatio-temporal and visual perception;

The Intermediate Conservation Sub-stages (5-6 years): This is a period of uncertainty which hinges on how experiments are carried out. For example, in the glass and liquid experiment, and according to Piaget, the quantity of liquid would be held to be the same if the tall, narrow glass was not too tall, or if the container was masked while the liquid was being transferred;

Conservation Sub-stage III (6-7 years): During this sub-period, the child achieves the conservation of amount.

As evident from the foregoing outline, not all forms of conservation are achieved during the pre-operational thought stage. Thus, whereas conservation of class, length, quantity (mass or substance) and area takes place between 7 and 8 years of mental age, that of weight and

volume does not occur until between the mental ages of 9 to 10, and 11 to 12 years; that is, during the concrete operational and formal or propositional operational stages, respectively.[15]

In a nutshell, as Piaget (1970c) maintains, the physical and intellectual development undergone by the child, and the operational activities that occur during 'the stages between 2 and 7 years of mental age are simultaneously an extension of the sensori-motor stages and the basis of the future concrete operations' (page 712).

III: The Concrete Operational Thought Stage (7-11/11½ years)

According to Piaget (1947/50: 139-147 and 1970c: 712, 723-726), and Dasen and Heron (1980: 7-8), the gradual achievement of conservation marks the transition from pre-operational thought to concrete operational thought in the child. But, as already noted, conservation is a product of the development of operational reversibility. Further advances in the achievement of conservation of the remaining properties during this and other succeeding stages, as shown above, depend largely upon the child's ability to master certain operations and to combine the latter into a "system" or "group". Put differently, the child should show evidence of being able to classify or to identify relationships between objects or events. All these operations begin as "mental acts" of the child on material physically present. These acts, which must also be capable of reversibility, become interiorised by the child.

The main operations developed during this period of latency in concrete operational thought are:

i. "Combining", for example, "putting all the red shapes together";
ii. "Dissociating", for instance, "sorting the red shapes into squares or circles";
iii. "Ordering" or "showing who was first, second, third, and so on, in a running race";
iv. "Setting up correspondences" or "matching" activities, objects or events, for example, a one-to-one correspondence;

v. "Classification" or the inclusion of one class in another to reveal the part-whole relationships within any given set of categories;

vi. "Qualitative seriation" or serialising, which involves the arrangement of concrete objects according to their progressive weight, size or shape. In Piagetian terms, this operation is 'the assembling of asymmetrical relations which express their differences, as in the following inference: Given A < B and B < C; therefore A < C' (Piaget, 1947/50: 44);

vii. Transitive relations, for example: 'Given that A = B and B = C; therefore, A = C', which the child attains between 7 and 8 years of mental age;

viii. "Qualitative equivalence" or substitution, which can be expressed thus: A1 + A'1 = A2 + A'2 (= B); B1 + B'1 = B2 + B'2 (= C) and so on (Piaget, 1947/50: 44); and, finally,

ix. "Number ability", or the construction of the concept of number, which requires the setting up and synthesis of correspondences, additive classification and seriation, all of which are organised as qualitative logical groupings of operations (Piaget, 1947/50: 143-146). Thus, a child who can discover the numerical value of objects, regardless of the qualitative class, for example, five oranges or ten girls, is said to have achieved "cardination"; if he can also order the same objects as they appear (first, second, third and so on), he is said to have attained "ordination". These concepts, however, can only be attained after the child has revealed an ability to conserve quantity.

Piaget (1947/50: 40-48; 139-147; and 1970c: 723-726) maintains further that any one of the above-named elementary and qualitative logical groupings of operations (structures de groupoïdes) possesses some of the following fundamental logico-mathematical properties:

i. "Composition" or "combinativity", whereby any two operations can be combined to form a third of the same grouping; for example: the two relations A < B and B < C may be combined into one relation: A < C, which contains them all; or

A + A' = B; B + B' = C; C + C' = D, and so on (Piaget, 1947/50: 40 and 43, respectively).

ii. "Reversibility" or "dissociativity", in which any combination can be separated to restore the status quo, expressed thus: B - A' = A. Therefore, each original operation of a group implies a converse operation; for example, subtraction for addition, and division for multiplication. As such, reversibility characterises the final states of equilibrium in the child's thought and the processes of development themselves (Piaget, 1947/50: 40-41; 1970c: 723);

iii. "Associativity", in which more than two operations can be combined in different ways to give the same result. Thus, though the child's thought remains fairly free to make detours in searching for solutions, the results obtained remain the same, as exemplified by the following inferences: 3 + (4 + 2) = (3 + 4) + 2 = 9; or (A + A') + B' = A (A' + B') = C (Piaget, 1947/50: 41 and 1970c: 723);

iv. "Qualitative identity", whereby combining an operation with its own inverse annuls that operation; for instance: 6 + (-6) = 0; or A - A = 0; B - B = 0; and so on. Thus, if a child makes a hypothesis in an argument and subsequently rejects that hypothesis, he eventually fails to return to the original data of the problem because, in his opinion, those data remain somewhat distorted by the hypothesis, even though it was discarded (Piaget, 1947/50: 42); and, finally,

v. "Tautology" or "special identities", in which combining a qualitative operation with the same operation results only in repetition because this operation cannot be transformed (tautology). For example, All men + All men = All men (and not: = All women); or X + X = X; Y + Y = Y; and so on. Numerically, however, such a transformation cannot be effected because of the application of the operation of combinativity, in which, as shown earlier, that combination results in a new number caused by the process of "iteration"; for example: 3 + 3 = 6; or A + A' = B or B + B' = C; and so on (Piaget, 1947/50: 42 and 43).

With the eventual development of elementary operational groupings (or the so-called "first-order operations") in their various concrete forms, and with their various types of conservation, the child gradually becomes less prone to fusing and/or confusing his own view-point with that of others. This is so because the child can differentiate and co-ordinate the different perspectives independent of himself. Thus, the elements and relations in the child's environment become composable, associative and reversible. As will be discussed in greater detail in Chapter II, which defines the concept of territorial decentration operationally, this stage marks the child's departure from egocentrism and egocentric thought processes to "relational co-ordination" or "decentration" in spatio-temporal and perceptual terms. As Hart and Moore (1973: 260) observed, this Piagetian model of the development of thought 'parallels Werner's (1948) theory of progressive constructivism and progressive perspectivism'.

Nevertheless, although the range of operational groupings developed during this stage is large, and judgment very often tends to be quite correct, as shown above, most of these operations are carried out in concrete situations. This means that the child must not be too far from the situation where what he is operating on mentally could be acted upon physically, if necessary. Hence, Piaget's conclusion that concrete operations consist of nothing more than a direct organisation of immediately given data. Furthermore, since the child often manipulates the facts to meet the hypothesis, an operation called "making assumptive realities" (Child, 1977: 126), during this latency period of concrete operations, the child thus fails to distinguish between hypothesis and reality; he is still incapable of hypothetico-deductive thinking and reasoning.

IV: The Stage of Formal or Propositional Operations (11/11½-15 years)

The beginning of adolescence at the mental age of about 11 or 11½ years also marks the advent of the fourth thought-development period of formal or propositional operations, which are generally expressed in the child's ability to think and reason verbally in adult logical terms. According to Piaget (1947/50: 147-150; 1970c: 711 and 727-729), this major

period, which lasts until the mental age of about 15 years, is divided into two sub-phases, namely, the organisational sub-period (11 or 11½ to 13 years); and the sub-stage of the achievement of the general combinatory operations (for example, the identification and analysis of all possibilities or alternatives in a thought process) and the second-order logico-mathematical operational groupings that act on other operations or elements of some other algebraic structure which has its own inverse.

During this formal operations period, the adolescent reveals a greatly increased understanding of most of the concepts embodied in symbols or signs, and use of language and second-order logico-mathematical systems; for instance, classifying all possible classifications or operational class inclusion: AA, AB, AC, BC, BB, CC and so on, and the manipulation of such propositional operations as implications ($p > q$), incompatibilities (p/q) and adjunctions ($p \vee q$) (Piaget, 1970c: 726-729). In other words, the adolescent at this stage can intricately refine information as "class within classes" so that he can begin to employ such a schema as : "all other things being equal" in search for causality and/or effect. Correspondingly, he begins to perform operations on verbal statements, or formal propositions about objects and events, instead of thinking or reasoning about actual actions or reality, to derive a further statement. With increasing decentration, he becomes more or less completely free from modes of concrete operational thought and behaviour, which, as noted earlier, tend to be egocentric.

As the ability to set up hypotheses as propositions develops, the adolescent also becomes increasingly capable of carrying out deductive thinking and reasoning, which seem to constitute the basis for empiric investigation. To achieve this, he identifies all possible alternatives and analyses them to find evidence upon which he can base his conclusions. As a result, his thought process can now be held to be abstract and oriented towards logical justification and proof. In short, and as Piaget maintains, by the end of this fourth stage at about 15 years of mental age, the adolescent is capable of abstract and hypothetico-deductive thinking and reasoning about the objects, situations and

events in his environment. Thus, he no longer needs to think, reason or talk about them, as was the case in the preceding sensori-motor and concrete operational thought stages, all of whose operations he is expected to have acquired and developed to such an extent that he can use them at the formal operational level as effectively as the adults do. Despite this, however, and in agreement with Dasen and Heron (1980: 10, 37), it is important to note Piaget's (1972: 10) revised contention that, though all adults may have the potential ability or competence to employ formal operations in their daily lives and activities, this competence may not be, and is in fact not, always utilised in every case and situation to the same extent because of the diversity of such influences as physical, ecological, cultural and demands of professional specialisation, all of which operate in varying degrees in the different environments of the world.

I.5 Some Critical Observations about Piaget's Global Stages Theory

Since Piaget promulgated his global stages theory of cognitive development, as outlined above, numerous cross-cultural studies, investigating a wide range of critical questions pertaining to the theory, have been conducted in such parts of the world as Africa, Australia, Britain, Canada, South America (Brazil) and the U.S.A. Within the restricted scope of the present investigation, it is not possible to give a detailed account of each of these studies. Nevertheless, further details of these cross-cultural studies can be found in such sources as the following: Dasen (1972, 1975a,1977a, 1977b); Dasen, Ngini and Lavallée (1979); Dasen and Heron (1980: 31-38); Flavell (1963/1970); Modgil (1974); Modgil and Modgil (1976); Munroe, Munroe and Whiting (1980); Okatcha (1977); Triandis and Heron (1980); Warren (1977) and Wober (1975).

Generally, the research questions to which these authors have specifically addressed themselves seem to have varied according to the investigators' fields of professional specialisation, research interests, objectives, and methodological facilities and procedures. However, the following questions seem to have attracted the greatest amount of the researchers' attention:

a. Are the cognitive processes and structures described by Piaget in his samples of Swiss children so universal that they can also be found in the cognitive development of populations in other parts of the world? (Dasen, 1977a, 1977b; Kamara and Easley, 1977; and Otaala, 1973: 12);

b. Does cognitive development always proceed in the sequential and invariant order postulated by Piaget? (Sigel and Cocking, 1977: 30);

c. Are Piaget's global stages of development and their hierarchical ordering identifiable and valid amongst populations of other cultures?;

d. Within any global stage, and in any non-Swiss population, are the relationships among the underlying structures of ability (competence) of the subjects similar to, or different from, those outlined in Piaget's theory with regard to his Swiss samples of children? (Otaala, 1973);

e. What relationships, if any, exist between the attainment of stages of human thought, as outlined by Piaget, and intellectual development, as measured in other, more traditional ways? (Otaala, 1973);

f. Are there aspects of the child's reasoning that are culturally determined? (Dasen, 1977a);

g. What are the relative roles of experience, language and the environment in facilitating or retarding the child's invariant progress from one sequential stage and/or sub-stage of thought to another succeeding one? (Otaala, 1973); and,finally,

h. What are the situational components which determine whether a particular basic operation will be applied or not (by a subject, or group of subjects, trying to solve any given Piagetian task)? (Dasen, 1977a).

The apparent controversial nature of the research findings reported from those cross-cultural studies which have dealt with some of the research questions listed above renders imperative the attempt to summarise some of the major critical observations so far made about Piaget's developmental stage theory. For more detailed accounts and discussion

of some of these limitations and criticisms, one can also refer to Boyle (1969), Bryant (1971, 1975), Bryant and Trabasso (1971) and Russell (1973).

The first critical observation relates to the consideration of the qualitative aspects of operational development, especially the sequence of sub-stages during the concrete operations stage. Generally, Piaget's thesis that operational development proceeds in a fixed, invariant and sequential order of stages and sub-stages has received more or less universal support from investigators working in the field of cross-cultural Piagetian psychology (for example, Goldstein and Scheeler (1941); Inhelder and Piaget (1958); Kohlberg (1963); Laurendeau and Pinard (1962, 1970); Piaget (1936/77, 1954, 1961); Tanner and Inhelder (1971) and Werner, 1948).

Some of the above writers also seem to accept the contention that the age at which those stages appear and the length of the same stages vary either as a function of hereditary (maturational) potential and experience (Tanner and Inhelder, 1971), or as a feature of the organism-environment interaction (Hunt, 1961: 256; Piaget (1970c); Tanner and Inhelder, 1971). On the other hand, there are other investigators who seem to hold the view that the order of cognitive development is not invariant (Ausubel, 1957, Bijou (1975) and Hunt, 1961). These last workers, who do not apparently support the invariant and sequential global stage-dependent theory, maintain that in so far as the rates and quality of change depend mainly on the particular kinds of experiences, the child is a product of learning experiences, showing different levels of ability, knowledge and skills as a function of each experience (Sigel and Cocking, 1977: 30).

It has been noted elsewhere, however, that, in spite of the strong support for the universalist position of Piaget's theory, there have emerged some suggestions of qualitative differences in concrete operational development, particularly with regard to those tasks involving the conservation concept, or the so-called "construction of invariants" (Dasen, 1977a: 167-168) and Dasen and Heron (1980: 17-19). These authors

cited two specific cross-cultural studies which claimed to have found some of these qualitative differences.

In the first instance, Greenfield (1966) administered to the unschooled Wolof children in Senegal a conservation (of liquid) task, which is not only similar to the task of the conservation of quantity or mass but also consisted of two parts. In the first part, water was poured from the initial container into a single narrower glass; and in the second part, the water was poured from the initial container into six shorter, narrower glasses. She eventually found that most of the subjects classified as "non-conservers" (or what Bovet (1974) later referred to as "pseudo-conservers") in the 8 to 9 and 11 to 13 year-old groups all made conservation judgments in the first part, but not in the second part of the procedure. The occurrence of this apparent non-conservation, or pseudo-conservation, could be accounted for by the following two reasons, according to Greenfield (1966). Firstly, she maintained that the subjects in her investigation attributed "magical powers" to the actions of the experimenter, or what she termed the "action magic phenomenon". This was done, she went on, because the subjects seemed to fail to pay attention to the perceptual features of the display, thereby getting stuck to the initial equality and thus giving pre-operational, non-conservation answers. The second reason she advanced was that of the inability of these subjects to distinguish between the statement about something and the thing itself, or the so-called "difference in value-orientation and the lack of real experience" phenomenon as postulated by Greenfield and Bruner (1969: 637-640).

The second study which reported some qualitative differences in the concrete operational development stage is that of Bovet (1974). According to Dasen (1977a: 167-168), Bovet (1974) reported a "deviation" from the usual sequence of stages in the acquisition of quantity (liquids) in illiterate Algerian children. From the first part of the task, Bovet obtained the following results:

a. the 5 to 6-year-old children (the youngest in the sample) gave undifferentiated non-conservation answers, which were based on the action of pouring the liquid from one glass

to another rather than on the dimensions of the containers (failure to pay attention to the perceptual features of the display);

b. while the 7 to 8-year-old children gave conservation answers, they were, however, unable to give proper reasons for their judgments;

c. still older children (8 to 11 years) gave dimensional non-conservation and/or transitional/intermediate answers; and, lastly,

d. the 10 to 12-year-old children gave conservation answers, which they justified by the usual identity, compensation and/or reversibility arguments.

In the second part of the study, Bovet (1974) asked the same subjects to perform two additional tasks, namely:

i. to pour water from one container to the next of a different shape, predicting each time where the water level would be (a problem that is usually solved correctly before achieving conservation); and,

ii. to pour quantities of liquid, as equally as possible, into pairs of glasses which differed either in diameter or in height, or in both dimensions (a problem usually solved correctly at about the same age as conservation tasks).

Bovet (1974) found that, although their attention had been drawn gradually to the perceptual aspects of the situation, the 7 to 8-year-old "conservers" could not solve these additional tasks correctly because of their failure to consider the dimensions of the glasses. As a result, they gave dimensional non-conservation answers when presented with the initial conservation task again. On account of this apparent "regression", and despite their initial conservation answers, Bovet (1974) concluded, as indeed Greenfield (1966) had done earlier, that these children were still at the pre-operational stage, and that they were not "conservers" but "pseudo-conservers". Hence, the emergence of another transitional, or the so-called "additional pseudo-conservation", stage. This stage was also reported to have occurred in both tasks for the conservation of quantity (using plasticine balls) and of weight,

but not in the conservation of length. However, as Bovet (1974) observed later, this pseudo-conservation stage is only a temporary departure from the usual sequence and is destined to disappear gradually with increasing age. Thus, to begin with, the pseudo-conservation stage gives way to non-conservation, then to transitional or intermediate, and finally, to complete conservation answers. Elsewhere, though pseudo-conservation is thought to have been responsible, to some limited extent, for the early rise and subsequent decline of conservation answers, as reported by de Lemos (1966, 1969), in a sample of Australian Aboriginal children (Hermannsburg) and later by Dasen (1970, 1974a[16]), there are as yet no reports of pseudo-conservation in other populations. Hence, the fairly recent recommendation that, in the current absence of totally convincing examples of qualitative differences and of universal pseudo-conservation in concrete operational development, further cross-cultural research should be undertaken to ascertain the occurrence, or the absence, of the qualitative phenomena referred to above (Dasen, 1977a: 167-168; Dasen and Heron, 1980: 17-19).

Another qualitative aspect that has received substantial attention from workers in the field of cross-cultural Piagetian psychology is that of the occurrence, during the concrete operational stage, of what Piaget termed: "décalages", or gaps within the child's knowledge. According to Sigel and Cocking (1977/79: 208), the term "décalage" is used to describe the appearance of similar kinds of behaviour at different points in time. As such, it captures the concept that there are "gaps" in learning, and it helps to reveal the patterns of cognitive development, or processes, which recur at later times across the usual developmental span. In Piagetian theory, two types of décalage have been identified, namely, the vertical and horizontal décalages. The term "vertical décalage" refers to those repetitions of behaviour which are observed across different levels of cognitive development and functioning. "Horizontal décalage" describes repetitions of behaviour within the same developmental stage. According to Dasen (1970: 17), "horizontal décalage", which is a statistical rather than theoretical construct, refers to the sequential application of the same structure of thought or operations to different contents of increasing difficulty

within the same stage, for which the best known example is the succession of difficulty in the conservation of quantity, weight and volume.

Of the two décalages, horizontal décalages have attracted a lot of attention in cross-cultural Piagetian psychology. For instance, a comprehensive discussion of this phenomenon with regard to the development of the concept of space in the child was undertaken by Laurendeau and Pinard (1970). For this same work, Piaget (1970d) wrote a brief introduction in which he tried to clarify his position with respect to the various issues the two authors had raised about the problem of "décalages". Dasen and Heron (1980: 20) pointed out that a useful review of cross-cultural data on horizontal décalages can be found in Lautrey and Rodriguez Tomé (1976)[17].

According to some authors (Dasen and Heron, 1980), the comparative experimental evidence collected so far from cross-cultural studies in Piagetian psychology to verify the sequence of difficulty or the occurrence of horizontal décalages in the conservation of quantity, weight and volume is not very consistent. Nevertheless, one study that has reported such horizontal décalages is that of de Lemos (1969). She found that, on average, the conservation of weight was easier than that of quantity, while that of volume was achieved last, in her sample of Australian Aboriginal children. This sequence of difficulty could be attributed to the fact that she always administered her tasks in the same order, with the conservation of quantity at the beginning. Thus, she did not control for what Dasen and Heron (1980: 20) termed the "order-effects". On the other hand, when Dasen (1972) conducted his study, in the same location, in which he replicated de Lemos' (1969) methods but controlled the order of presentation for "order-effects", he neither found the inversion referred to above nor the fact that the conservation of volume was preceded by that of weight, as would normally be expected. Furthermore, when Dasen (1972) examined individual results rather than group averages, he found some patterns which did not confirm the expected sequence in almost half of the Aboriginal sample and in 10 per cent of the Western comparison group. Hence, the observation that there is need both to concentrate on examining individual rather than group results and to carry out longitudinal studies to

establish the relative influence of some of the qualitative differences discussed above (Dasen and Heron, 1980: 20).

The fourth major criticism of Piaget's theory of global stages originated mainly from the American school of behavioural psychologists, which tended to express some scepticism about Piaget's clinical methods of establishing observations and views. These psychologists maintain that Piaget's views depended heavily upon the verbal introspections of the immature minds of the children he interviewed. They would have preferred the evidence to have been collected independent of the subject's attitudes and self-reports, as is often the practice in the behavioural psychologists' tradition. However, and as Child (1977: 128) points out, replication studies have been undertaken, in different social and ethnic environments, using representative research samples with varying degrees of verbal talent. In these cross-cultural studies, the research methods and procedures have been modified to overcome some of the limitations of introspection. These studies have thus tended to yield results which are not only coherently comparable but also provide the developmental pattern which is similar to that outlined by Piaget.

In the fifth instance, and according to Child (1977: 128), Piaget's original thesis was criticised because he apparently placed the role of instruction and experience in cognitive development at a lower level of priority than did such other workers as Bruner (1960, 1966) and Bryant (1971, 1975). These authors maintain generally that 'the consistency of the stages is a function of the regularity of a culture's child-rearing patterns rather than of some in-built and inevitable sequence of development'. Child (1977) contends further that 'an inability to carry out the kinds of tasks set by Piaget and his followers may arise from insufficient information rather than lack of ability as a function of maturation' (page 128). Nevertheless, the present writer has discovered that on account of Piaget's more recent re-stated position, this criticism does not seem to be any longer justifiable, as evidence below helps to show.

Firstly, and as noted earlier, Piaget (1970c: 713; 719-722) was very clear about the relative roles of the four classical factors in

influencing the development of human thought. Amongst other things, he argued thus:

> In considering the problem of duration or rates of succession of the stages, we can readily observe that accelerations or delays in the average chronological age of performance, depend on specific environments (for example, abundance or scarcity of possible activities and spontaneous experiences, educational or cultural environment), but the order of succession will remain constant (page 713).

Secondly, Piaget further showed that he was aware that some authors believed in the possibility and desirability of the "unbounded acceleration" concept in the rates of succession of the stages. He particularly cited, for criticism, Bruner's (1960) assertion that 'if one tackles it the right way, one can teach anything to children of any age', adding that Bruner had since dropped this contention. To conclude his argument, Piaget advanced what he termed a "plausible hypothesis", maintaining that:

> For a specific subject, the speed of transition from one stage to the following one has an optimal rate. That is, the stability and even the fruitfulness of a new organisation (or structurisation) depends on connections which can be instantaneous but cannot be indefinitely postponed either since they would then lose their power of internal combination (Piaget, 1970c: 713).

Therefore, it is not very surprising to note that some authors (Child, 1977: 128-129) seem to have eventually acknowledged the fact that even those '"training programmes" designed to ring the changes of the patterns discussed above and accelerate development have not, as yet, produced more than minor deviations in Piaget's developmental sequence'.

A sixth criticism advanced against Piaget's global stage theory, and one that seems to be related to the fifth one, is that, in his attempts to identify and describe the process of the unfolding of events at specific ages and stages in the child's development, Piaget seemed to have overlooked the part played by the differences in mental and environmental factors while the stages prescribed are not so rigidly coupled with age. Despite Piaget's (1970c) re-stated position which was noted above,

some research evidence has tended to confirm this sixth critical observation, as the following examples show.[18]

Reporting his findings from the studies investigating the children's understanding of number and related concepts, Dodwell (1960,1961) concluded, inter alia, that 'whilst Piaget is on the whole correct in his description of the child's description of number, the pattern of development is neither neat nor as rigid as he would have us believe' (1961: 35). In another study of spatial concepts, in which he tested 194 five-to-eleven-year-old Canadian children, Dodwell (1963: 161) found that while 'the over-all ability to deal correctly with spatial concepts improves with age, as one might expect, no clear-cut progression from one type of thinking about space to another could be identified in the data'.

Elkind (1961a) discovered that the conservation of number, continuous quantity and discontinuous quantity amongst his sample of American children, aged between 4 and 7 years, was age-dependent. A similar finding was made by Elkind (1961b, 1961c) in his subsequent studies of the conservation of global quantity, weight and volume amongst a larger number of 5 to 11-year-old American children, and amongst 500 twelve-to-fifteen-year-old adolescents,respectively. On the other hand, while Lovell and Ogilvie (1960a,1961), who investigated the conservation of substance and weight in a large sample of English junior school children, confirmed the three stages in the development of conservation, they, nevertheless, noted the difficulty of classifying a child in the transition stage.

In the seventh instance, Piaget has been criticised for having concentrated his research efforts mainly on studying problems in mathematics and science. As a result, the argument seems to go on, the bulk of his theorising has been applied to those subjects with much less regard for other subjects of the school curriculum (Child, 1977: 129). Nevertheless, the present writer's view is that this criticism is an unfair assessment of Piaget's research efforts because of two main reasons. Firstly, and as was noted at the beginning of this chapter, Piaget was basically a biologist and genetic epistemologist, who later developed

an interest in genetic psychology. The importance of understanding this ordering of his philosophy and research interests has been spelt out succinctly elsewhere by other writers, who have contended that:

> ...even though Piaget is without any doubt one of the most influential personalities in developmental and child psychology, he is not in fact a psychologist but an epistomologist. This distinction is not trivial, (sic) because it explains the whole thrust of his work, as well as some difficulties and misunderstandings which occur .... when the theory (Piaget's) is used by psychologists (Dasen and Heron, 1980: 3).

Given the foregoing explanation, it would seem reasonable that, as a scientist, Piaget should devote much of his time and effort to undertaking research work in the fields of the development of the structure of human thought as well as in mathematics and science. While the restricted compass of this study does not permit a close examination of each of them, the following may be cited as among the major works published by Piaget and/or his colleagues: Piaget (1926/29, 1927/51, 1928/76, 1936/77, 1947/50, 1937/55a, 1955b/69, 1966, 1970a, 1970b, 1970c, 1970d, 1971a, 1971b, 1972); Inhelder and Piaget (1955/58, 1964/69); Piaget and Inhelder (1956); Piaget and Szeminska (1941/52) and Piaget, Inhelder and Szeminska (1948/60). Most of these original research endeavours formed the basis for much of the subsequent research work done and published by authors working away from Piaget's Genevan base. Some of these are: Almy (1967a, 1969); Brookes (1974); Butterworth (1977); Cross (1974); Dasen (1974b, 1975, 1977c); Dasen, Berry and Witkin (1979); Dasen, Lavallée and Retschitzki (1979); Dasen, Ngini and Lavallée (1979); Elkind and Flavell (1969); Flavell (1970); Flavell and Wohlwill (1969); Laurendeau (1977); Laurendeau and Pinard (1970); Lovell (1968); Lovell and Ogilvie (1960); Lovell and Slater (1960); Lovell and Ogilvie (1961); Lovell, Healey and Rowland (1968); Mureria and Okatcha (1977); Nyiti (1977); Okatcha (1977); Omari (1975, 1977); Otaala (1971, 1972, 1973); Richmond (1970); Satterly (1964, 1977), Shantz and Smock (1966); Sauvy and Sauvy (1972/74)b and Whiting, 1976).

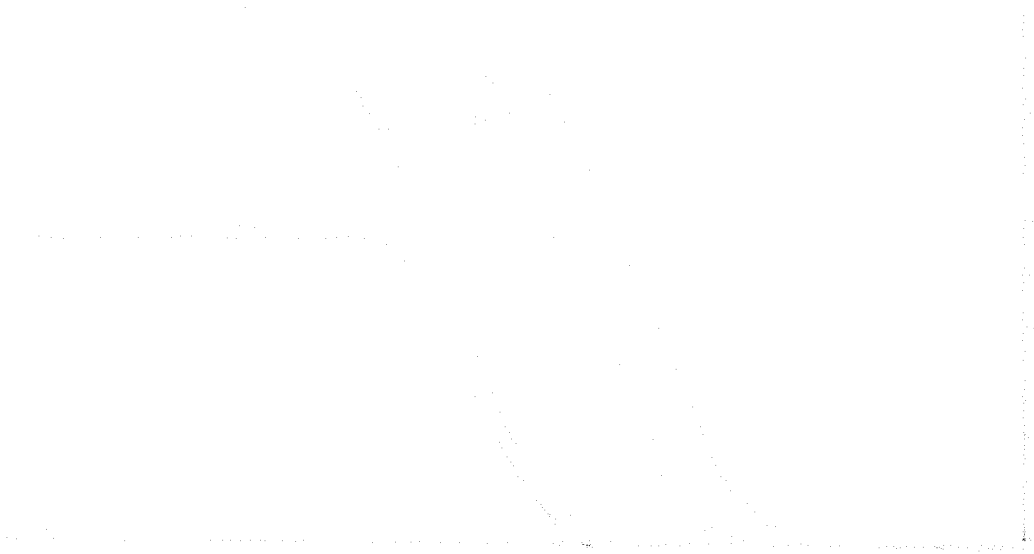
Secondly, and though he never claimed to be an educational psychologist[19], Piaget also personally addressed himself to some problems which seem to lie outside the traditional realms of mathematics, science and the

development of human thought (for example, one can refer to Piaget (1928/76: 113-135), and Piaget and Weil, 1951). Or, as indeed Child (1977: 129) observes later, Piaget's theoretical framework has provided subsequent investigators into the problems of general educational curriculum planning, development and renewal with what seems to be a functional basis for understanding the processes and different rates of learning on the one hand, and for identifying areas of improvement in the various instructional and/or learning strategies on the other. A few examples of the substantial research-work carried out along these lines will serve to illustrate this point.

For geography, history and/or social/environmental studies, the following works can be noted: Carnie (1966, 1972); Hallam (1969); Hart and Moore (1973); Jahoda (1962, 1963, 1964, 1969); Jahoda and Tajfel (1965); Jaspars, van de Geer, Tajfel and Johnson (1965); Lambert and Klineberg (1967); Marsh (1966); McNaughton (1966); Oliviera (1976); Rhys (1972); Satanek (1971) and Stoltman (1971, 1972, 1976a). In music, Sloan (1969) studied the child's conception of musical scales according to Piaget's developmental theory. In religious and the related moral studies, while Goldman (1964) studied the growth of religious concepts, Kay (1968) dealt with a broader field of moral development from a psychological point of view. Finally, and in addition to some of the major summaries of Piagetian research, it can be instructive to refer to Beard's (1969) and Wallace's (1965) compilations which trace those studies that dealt with problems relating to concept growth and the education of the child.

The eighth major criticism of Piaget's theory is that because of his epistemological approach, Piaget more or less ignored the consideration of the factor of individual differences in his attempts to explain the development of human thought. According to Dasen and Heron (1980: 27-28), Piaget explicitly stated his position, and he is quoted as having argued thus: 'I have no interest whatsoever in the individual. I am very interested in general mechanisms' (Piaget, 1971: 211). As a result, this status quo was maintained in the Geneva school of Piagetian psychology until Inhelder (1968), followed by Schmid (1969) and others, began using some Piagetian tasks in clinical psychology. Nevertheless,

FIGURE I.1



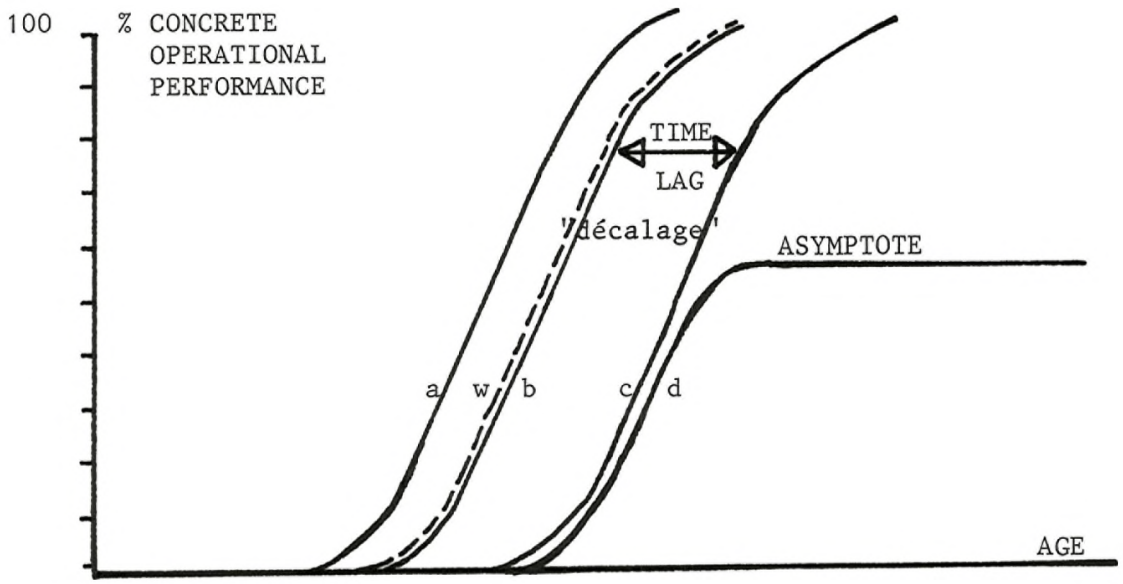


Figure I.1: Theoretical Development Curves: Percentage of Concrete Operational Performance over Age.

Notes: Curve "w" is assumed to be the developmental curve for a sample of children from a Western, technological background, on any particular Piagetian task of the concrete operational stage.

Curves "a", "b", "c" and "d" are possible developmental curves from cross-cultural studies (After Dasen and Heron, 1980: 21-22).

Dasen and Heron's view is contrary to Piaget's, and they underline the significance of investigating individual differences, as shown below.

Dasen (1972, 1973[20], 1977a: 168-196, 1979a, 1979b); and Dasen and Heron (1980: 20-30) discussed, inter alia, the problem of quantitative differences in the attainment of concrete operations. They maintained that these differences are usually expressed in terms of the proportion of children who reach the last sub-stage on any given concrete operational task, and that if these proportions are plotted over age, development curves such as those shown in Figure I.1, page 38, tend to occur. To quote the two authors at length, these different types of curves have been described as follows:

> Curves of type (a) reflect a "rate" of development which is in advance of, and type (b) similar to, that found in Western children (W); type (c) reflects a rate which is slightly slower, leading to a "delay" or "time-lag", but all children eventually reach the sub-stage in question. These curves do not show the rate of development of a concept in an individual child, but in the sample as a whole .... Curves (a) and (b) .... simply reflect 'the fact that stages .... are accelerated or retarded in their average chronological ages according to the child's cultural and educational environment' (Piaget, 1970: 721)....
>
> Curves of type (d), those which show a levelling-off or "asymptote", do present a problem to the theory, because they reflect the fact (if we take the results at face value) that some individuals do not reach the concrete operational stage, at least not as far as the particular concept being studied is concerned.... It is not uncommon to find in the same population a type (d) curve for some concepts, and types (a) or (c) for other concepts. Thus, a development curve never reflects an "operational level" or any other such global construct, but is limited to the concept being studied, and to the particular experimental setting in which the measures are obtained. Many type (d) curves have been reported in the (cross-cultural) literature (for example, Dasen, 1973; Lautrey and Rodrigues Tomé (1976) and by Kamara and Easley (1977).... (Dasen, 1979b; Dasen and Heron, 1980: 21).

In short, the occurrence of asymptotic curves, or those developmental curves which do not reach 100 per cent, especially in studies which involve adolescents and adults, indicates that there is a large

proportion of individuals who do not acquire (or at least do not display) a particular set of concrete operations. Moreover, and according to Flavell and Wohlwill's (1969) definition, a concept characterised by such an asymptotic developmental curve would be a "weak" universal (if those who do not acquire it follow the same sequence of sub-stages). This, therefore, constitutes yet another limitation to the universality of Piaget's stages (Dasen, 1977a 169).

Subsequently, attempts were made to identify which various factors help to explain the occurrence in the rates of the development of human thought of such quantitative differences as the asymptotic type (d) curves shown in Figure I.1, page 38, in samples which are often quite homogeneous in their socio-physical and cultural environment. Thus, Dasen and Heron (1980) contended that the factor of individual differences, which, as noted earlier, was apparently ignored by Piaget, is one of the eight factors that help to explain some of the quantitative differences discussed above. They have argued firmly that for a correct interpretation of type (c) and (d) developmental curves, attention must be focussed on a consideration of individual differences, mentioning as examples, studies undertaken in Ghana, but independently, by Adjei (1977) and Kirk (1977) to examine these individual differences in terms of maternal teaching styles (Dasen and Heron, 1980: 28).

In addition to the factor of individual differences, and while citing some relevant cross-cultural studies that have been carried out to investigate which factors affect the rates of cognitive development, Dasen and Heron (1980: 22-38) discussed in detail the seven other factors.[21] Briefly, these seven factors are:

i. "Urbanisation", whereby urban and rural samples within the same cultural groups are compared (for example, Greenfield, 1966; Mohseni (1966); Peluffo (1967); Poole (1968); Kim-inyo (1977) and Opper (1977). The tendency in such studies was to find type (c) and (d) curves in the rural samples with almost every task, whereas no "time-lag", or only a small one, occurred in urban environments;

ii. "Acculturation", in which the "time-lag" gets reduced with increasing contact with a Western or modern technological culture (de Lacey, 1971; Dasen, 1970, 1974b and 1977a), and disappears completely if the children are brought up in a totally Western context (Dasen, de Lacey and Seagrim, 1973; and Seagrim, 1977).

iii. "Schooling", whose effects are less systematic. For instance, Greenfield (1966) found a type (d) curve in the unschooled Wolof sample, while a type (c) curve occurred in the urban and the rural schooled samples, with a faster rate of development in the rural sample. In Rwanda, Laurendeau (1977) reported a significant effect of schooling. Contrary to these findings, Goodnow (1962), Kelly (1977) and Kiminyo (1977) found no significant effects of schooling in their studies.

iv. "Eco-cultural relevance" of particular conceptual areas, which operates because, according to Berry's (1966a,1971, 1976) functionalistic "eco-cultural demands" model, people develop those skills which are useful for their survival in a particular ecology with its associated subsistence-economy. Hence, Berry's (1976) contention that such nomadic, hunting-and-gathering people as the Eskimos develop spatial skills to a higher degree than such sedentary, agricultural people as many African populations, a model that will be discussed later in this study. However, for examples of some studies which have extended Berry's eco-cultural demands model to the area of cross-cultural Piagetian developmental psychology, reference can be made to Dasen (1975a, 1977a: 184-196) and Dasen and Heron, 1980: 23-25.

v. "Cognitive ambience" or, as defined by Heron, 1974: 97 (after Heron and Simonsson, 1969: 291) "the total pattern of implicit cognitively relevant cultural values, communicated through linguistic and other behaviour by adults and older children", and whose main feature is "the unintentionality, day-to-day usualness, the taken-for-granted assumptions about what is, and what is not, important in life" (also quoted by Dasen, 1977a: 178, and Dasen and Heron, 1980: 26). Thus, from

the pre-linguistic stage until the end of the first year, every child develops a "culturally-shaped behaviour", or what Maccoby and Modiano (1969) have called "cognitive style", which is based dominantly on the pattern of stimulation whose quality and quantity are usually determined by the culturally-shaped behaviour of the parents, older siblings, other children and adults. The significance of this factor of "cognitive ambience" is reported to have found circumstantial support in a study carried out by Dasen, de Lacey and Seagrim (1973).

vi. "Training studies or intervention techniques", which are direct and short-term, can be, and have in fact been, carried out, without necessarily changing anything in the environment and culture, to reduce or overcome the cultural differences, which seem to be partly responsible for the occurrence of "time-lags" in the rates of development of the samples in the above-named eco-cultural environment. From their survey of some of the various studies undertaken so far (for example, Pinard, Morin and Lefebvre (1973) in Rwanda; Heron and Kroeger (1975) in West Berlin, using migrant Yugoslav workers; Dasen (1975b, 1977a); Dasen, Lavallée and Retschitzki (1979); Lavallée and Dasen (1979) and co-workers whose series of eight training studies, carried out among the Eskimos, West African (Baoulé) and East African (Kikuyu) children, are summarised in Dasen Ngini and Lavallée, 1979), Dasen and Heron (1980: 30) conclude that while the quantitative variations are amenable to change, the time-lags, which do not always reflect some basic incapacity, can be bridged through adequate educational experiences if this is deemed worthwhile and desirable; and, lastly,

vii. "Methodological problems and considerations", which have attracted a lot of attention from cross-cultural investigators, as discussed at length by Dasen (1977c: 13-16), Kamara and Easley (1977), and Dasen and Heron (1980: 31-49). In outlining these major methodological problems, Dasen (1977c) also made an attempt to suggest the various ways in which some of them can be, or have actually been, overcome. Thus, the following issues have been identified and discussed in the sources cited above:

a. the problem of determining precise ages of the subjects in the absence of reliable records in some parts of the world, which can be solved by "guesstimating" the subjects' age (Kelly's approach to the problem in Papua New Guinea); observing the exact stage of tooth eruption at each position in the subject's mouth (Kirk, 1975, in Ghana); and using a combination of great events, slash-and-burn farm site enumeration, and sibling comparison (Kamara, 1971; Kamara and Easley (1977), with the Themne of Sierra Leone; and Nyiti (1973, 1977), with the Meru of Tanzania);

b. the problems relating to the quality of communication between the subject(s) and the experimenter(s) and to the necessity of using Piaget's "clinical method of critical exploration" or the "clinical interview method", especially when the two parties neither belong to the same culture nor speak the same language fluently. Amongst the suggestions made for overcoming these problems are: encouraging qualified "native" researchers to undertake some of these studies in their local areas assuming they have developed the required amount of decentration (see, for example, studies carried out by Adjei (1977), Al-Fakhri, Salima (1977), Etuk (1967); Kamara (1971, 1977), Kiminyo (1977), Mwaniki (1973), Nyiti (1973, 1977), Omari (1972, 1975, 1977) and Otaala: 1971, 1972, 1973); training local students to work as experimenters and supervising them during the actual period of experimentation; and lastly, using interpreters, or any "second" language of formal instruction in schools (for example, Kiswahili);

c. the problem of selecting the appropriate statistical technique(s) or model to compare, for example, two samples over several age-groups has also received attention. While Kamara and Easley (1977: 39-49) suggested their model in which "p values are combined over age classes", Dasen (1977c: 15-16) directs the reader's attention to other parametric and non-parametric techniques which have been used by other workers (Laurendeau-Bendavid (1977) and Kelly (1977)), and concludes by contending that:

> The problem of which inferential statistics are most appropriate to Piagetian data has never bothered the Geneva school, because Piaget and his followers have always refused to treat the "Piaget tasks" as performance tests.... (page 16)[22];

d. the problem of ensuring that the "operational performance" of the subjects on the tasks which are used in experimental situations really reflects the underlying capacity or "competence" of the subjects, which was termed the "competence/performance distinction model"[23] by Flavell and Wohlwill (1969), and has been discussed in detail by other workers (Dasen, 1977a: 172-178, 1977c: 10-11) and Dasen and Heron, 1980: 32-38), who cite other cross-cultural workers who have attempted to explain their results in terms of this model. These other workers include, for example, Bovet, 1974, who tested Algerian illiterate adults; Pinard, Morin and Lefebvre, 1973, who worked with French Canadian, unschooled Rwandese and schooled Rwandese children; Dasen (1975b, 1976), who tested Eskimo children; and Dasen, Ngini and Lavallée, 1979, whose summary report of the eight training studies showed that very rapid learning, which indicates the actualisation of latent competence, occurred in varying degrees amongst the 12-to-14-year-old West African (Baoulé) and East African (Kikuyu) children who had been trained for the spatial concept of horizontality. Dasen and Heron (1980: 36) maintained that in most of the examples cited, with the exception of Pinard et al. (1973), actualisation of latent competence was reported to have occurred for older subjects only, that is, at an age where the development curve shows an asymptote in that particular population. Thus, they concluded, while some of the quantitative differences in concrete operational development are only differences in task performance, these differences do not adequately reflect the presence of the underlying structures (competences) (Dasen and Heron, 1980: 37); and, lastly,

e. the problem of the apparent lack of a consistent relationship between the tasks or "inter-task consistency", especially in cases where this domain-consistency, or the so-called "structure d'ensemble", or "of structural integration" is predicted by the Piagetian theory, has been identified and discussed (Dasen, 1977c: 11-13; and Dasen and Heron, 1980: 39-44). According to Piagetian theory, an "operation" is never supposed to appear in isolation, but is always linked to other operations in a "structure d'ensemble". Nevertheless, Dasen and Heron (1980) have discovered that on account of evidence from a number of cross-cultural studies on the development of concrete operations (Dasen, 1975a; Goodnow

(1962); Heron (1971, 1974): Heron and Simonsson (1969); Heron and Dowel (1973); and Heron and Kroeger, 1975), 'the "structure d'ensemble" posited for the Genevan child does not necessarily hold elsewhere; two concepts which develop congruently in the average Genevan child may develop at very different rates in another culture if one of them is more highly valued (that is, if it is culturally more relevant, or, is more adaptive) in that other culture' (Dasen, 1977c: 11; Dasen and Heron, 1980: 43). Thus, for example, the element of "structures d'ensemble" in Piagetian theory tends to become questionable either whenever horizontal décalages occur in the first organisational sub-period of the concrete operational stage, during which sub-stage, as already noted, concrete operations are expected to be progressively applied to an increasingly wider array of contents, or whenever type (d) asymptotic curves occur in the second sub-period of equilibrium, a sub-stage of the concrete operational stage that usually marks the achievement of concrete operational thinking. However, Dasen (1977c: 11) and Dasen and Heron (1980) conclude that, as with the problem of the competence/performance distinction, this question of domain-consistency or "structure d'ensemble" needs further cross-cultural investigation.

The last, but not least important, critical observation about Piaget's global stage theory relates to the paradox that has been created recently as a result of Piaget's (1972) revised position regarding the stage of formal operations, or in cross-cultural Piagetian terms, 'the universality or "cultural relativism of the developmental endpoint"' (Dasen, 1977c: 9). According to Piaget (1972), as cited and discussed by Dasen (1977c: 6-9), and Dasen and Heron (1980: 49-53), though the first results, which had been 'based on a somewhat privileged population' (1972: 6) led to the conclusion that 'all individuals reach the stage of formal operations, if not between 11 and 15 years, at least between 15 and 20; however, they reach this stage in different areas (environments) according to their aptitudes and their professional specialisations' (Piaget, 1972: 10). Or, as Dasen and Heron (1980) have paraphrased this new position in terms of Flavell's and Wohlwill's (1969)

competence/performance distinction model, 'all adults have the competence for formal operations, although it may be reflected at the performance level only in some favourable circumstances' (page 49).

According to Dasen and Heron (1980), the few cross-cultural studies that have included tasks of the formal operational stage seem to have found very little evidence of formal operational performance (for example, Philip and Kelly (1974) and Kelly (1977), who reported a general lack of formal operational thinking among the adolescents in Papua - New Guinea; and Laurendeau-Bendavid (1977), who reported that only a few of the schooled Rwandese adolescents could use formal operations in Piaget's and Inhelder's (1958) tasks on the "quantification of probabilities" by comparing two fractions). Moreover, attempts to improve on the subjects' formal operational thinking amongst Eskimo children only resulted in partial success; they attained the first sub-stage, but not the second one (Feldman, 1974). These observations are very significant to the present investigation since, as will be shown later, almost the entire sample studied consists of subjects whose chronological ages fall in the range of 11 to 20. However, as Dasen and Heron (1980) conclude a lot of ground in cross-cultural Piagetian research has yet to be covered to accumulate empirical evidence which would help to throw some more light on the question of the universality of Piaget's sequential and invariant stages of the development of the structures of human thought, including that of the "cultural relativism of the developmental endpoint" in the fourth and last stage of formal operations. It is, thus, within this general context and framework that the present study of Piaget's stages theory with specific reference to the development of territorial decentration in Kenyan African children hopes to make some contribution towards an understanding of some of the issues and problems discussed in this chapter.

I.6 Summary

Within the scope of this first chapter, an attempt has been made to present a general and brief descriptive outline of Piaget's theory of the global stages of the development of the structures of human thought. This outline involved a consideration of, inter alia, the following

major aspects: the characteristics of Piaget's cognitive developmental theory; the factors influencing the sequence of the development of the structures of human thought according to the Piagetian system; Piaget's four global stages of the development of intelligence; and the critical observations about Piaget's stage-dependent theory, including those emerging from the cross-cultural studies so far carried out to investigate some of the various aspects of Piagetian theory.

It is, therefore, hoped that the reader will find this overview of Piaget's theory a useful basis for understanding the general conceptual framework within which this study of the development of territorial decentration in Kenyan African children is being undertaken. Thus, the second chapter will deal with specific aspects of the operational definition of the concept of territorial decentration, its origin and evolution, and with the current status of the pertinent literature on this concept. These considerations will form the necessary basis for stating the problem, purpose(s) and hypotheses for this investigation.

I.7 Notes and References

1. In consonance with the practice recommended for the period 1976-1986 by UNESCO's International Geographical Union's Commission on geographical education, and as Lwanga-Lukwago (1979: 75) argued, while the term "geography" refers to those courses taught in schools, college and university departments of geography for purely academic or educative purposes, that of "geographical education" describes specifically those courses designed and mounted in teacher-education institutions for the professional pre- or-in-service training of teachers of geography, including those leading to higher professional qualifications. See also: Graves (1975: viii).

2. See the "Comment" (Obituary) entitled: "Jean Piaget" in the Times Educational Supplement, London, page 2, and dated 19th September, 1980, in which the death of Professor Piaget was reported to have taken place during the third week of September, 1980; refer also to Boden (1979: 1-29 and 149-155).

3. As will be defined operationally and discussed in greater detail in Chapter II, the "concept of territorial decentration", upon whose development in a sample of Kenyan African children this study focusses attention, is the process through which one is expected to broaden one's centre of spatial or territorial interest progressively from the self-centred or egocentric self, household compound and family environments to such distant and larger geo-political territories as the village, division, county or district, town, province, city, nation-state and the world community of sovereign nation-states. A "territorially-decentred subject" will be one who displays evidence of having developed the operational notion or concept of the correct relationship between such territories as county or district, town or city, country or nation-state, and an understanding of how these territories are related to others at the world-wide level. This subject will also show an ability to distinguish between his own point of view and that of others through progressive decentration from egocentricity to reciprocity, and will be classified in Territorial Decentration Stage 3 (TDS.3)

on account of his having attained the maximum score on the Territorial Decentration Test (TDT), which is this study's main criterion instrument.

4. The first English edition of this work was published in 1928 by Routledge and Kegan Paul, London, and was reprinted in 1951. However, this writer has used the 1976 edition, published by Littlefield, Adams and Company, Totowa, New Jersey, U.S.A.

5. Although Piaget's original work in French, entitled: La naissance de l'intelligence chez l'enfant was published in 1936, and was subsequently translated into English and published by Routledge and Kegan Paul, London, in 1953, this investigator has used Penguin Education's most recent translation by Margaret Cook, published in 1977. Thus, all the page references cited in this study correspond to those of the 1977 edition.

6. Piaget's original work in French, entitled: La psychologie de l'intelligence, was published in 1947. It was translated into English by Piercy, M. and Berlyne, D.E., and was published in London by Routledge and Kegan Paul in 1950. Thus, any page references to this work can be found in the 1950 edition to which the present writer had access.

7. "Intelligence" is defined in the Piagetian system as 'adaptation to the environment' (Dasen, 1970: 1).

8. Refer also to Drever (1964: 86).

9. For a more detailed discussion of the problem of the relationship between psychology and genetic epistemology, reference can be made to Piaget's (1970c: 729-732, 1971) comments, which he succinctly concluded thus:

> .... the psychological theory of the development of cognitive functions seems to establish a direct .... and intimate relationship between endogenous factors and the environment, and the epistemological notions of necessary interaction between the subject and the objects. The synthesis of the notions of

> structure and of genesis that determines psychogenetic study finds its justification in the biological ideas of auto-regulation and organisation, and touches on an epistemological constructivism which seems to be in line with all contemporary scientific work; in particular, with that which concerns the agreement between logico-mathematical constructions and physical experience.... (pages 731-732). See also Piaget (1970d).

10. According to Sigel and Cocking (1977: 15), "schema" is 'a coherent, organised set of information (or knowledge) about objects, events, or whatever may be the content in question....'.

11. This system of citing references has been used throughout this thesis. In this case, for example, the name(s) refer(s) to the author(s) or investigator(s), followed by the year(s) of publication, after the colon (:) marks.

12. Quoted from the final draft of a chapter prepared to appear in: Triandis, H.C. and Heron, A. (Eds.) (1980), and to which the present writer had access through personal communication with Dasen, P.R., one of the co-authors of the chapter, between August, 1979 and February, 1981.

13. Refer also to Piaget (1947/50: 87-116).

14. Just like the "concept of egocentricity", "decentration" is central to the problem under investigation in this study, in which it is used to refer to "the act of extending one's territorial or spatial perspective or world progressively outwards from the centre, as opposed to the process of centration or the act of centring. See also Note I.7.3, page 48, and Section II.2.b of Chapter II, page 56.

15. Therefore, when conservation, which is the equivalent of the operation of "object permanency" developed during the sensori-motor stage, takes place at the succeeding higher concrete operational level, thereby repeating or reconstructing the same structure at two different stages, this is termed a "vertical décalage". On the other hand, when the construction of the same structure takes

place within a single stage but at different chronological ages, depending on the "content" to which the reconstruction is applied, this is called a "horizontal décalage". These two phenomena have been illustrated by Dasen and Heron (1980) thus:

> .... the child may give a "conservation" answer when asked about the quantity of clay, but a "non-conservation" answer when asked about its weight. Thus, he is able to use concrete operations with the concept of quantity, but not the concept of weight; one or two years later, he may extend the concrete operational logic to weight, but not yet to volume. Similarly, a child may give a class-inclusion answer when asked about a bunch of flowers, but give a pre-operational answer when asked about animals (page 9).

16. As cited in Dasen (1977a: 168) and discussed by Dasen and Heron (1980).

17. As cited by Dasen and Heron (1980: 20).

18. A discussion of the findings of the studies of the development of territorial decentration, with which this research is concerned specifically, is undertaken in the critical review of pertinent literature, Chapter II.4, pages 69 - 100.

19. See also, the remarks made in the "Comment" referred to in Note I.7.2, page 48 .

20. As cited by Dasen (1977: 169).

21. See also Dasen (1970: 21-29).

22. Reference should also be made to the discussion by Kamara and Easley (1977) of the difficulties of treating Piaget's tasks as performance tests and the suggested alternative paradigm of structural analysis, in Dasen (1977c), pages 49-57.

23. Flavell and Wohlwill (1969: 71-75) operationally described their "functionalistic competence/performance distinction model", which, according to Dasen (1977a: 176) and Dasen and Heron (1980: 33), was derived from Chomsky's psycho-linguistic model, in the following words, which are also quoted by Dasen (1977a: 177) and Dasen

and Heron (1980: 33-34):

> .... a psychological theory that accounts for complex behaviour will have two principal components: "a competence model", which is a formal, logical representation of the structure of some domain (.....); and "an automaton (performance) model", which represents the psychological processes by which the information embodied in competence actually gets accessed and utilised in real situations. (Thus) the "competence model" gives an abstract, purely logical representation of what the organism knows or could do in a timeless, ideal environment, whereas the "automaton (performance) model" has the job of describing a real device that could plausibly instance that knowledge or skill, and instance it with the constraints [memory limitations, rapid performance, etc.] under which human beings actually operate.... (1969: 71).

Note: These brackets [.....] belong to Flavell and Wohlwill (1969), while these (.....) and all the words enclosed thus "....." are the present writer's.

CHAPTER II

THE HISTORICAL AND EVOLUTIONARY PERSPECTIVES OF THE CONCEPT OF TERRITORIAL DECENTRATION, AND STATEMENTS OF THE PROBLEM, PURPOSES, NATURE OF AND LIMITATIONS TO THE SCOPE, OF THE STUDY

II.1 Introduction

In Chapter I, a descriptive outline and critical overview of Piaget's theory of the global stages of the development of the structures of human thought and intelligence were both carried out as a basis for the consideration of the origin and evolution of the concept of territorial decentration, with the development of which this investigation is specifically concerned. This second chapter sets out to fulfil, inter alia, five main aims. These are to:

a. attempt an operational definition of the concept of territorial decentration and some related key terms and concepts used in the development of the theoretical framework and experimental design of this study;
b. outline the nature of the problem and state the research questions;
c. discuss the origin and evolution of the concept of territorial decentration through a critical review of the pertinent research literature which leads to a statement of the purposes of this investigation;
d. delineate the nature or type of the study; and, finally,
e. outline the major limitations to the scope of this research, and suggest possible ways and means of overcoming some of these limitations.

II.2 Towards an Operational Definition of the Concept of Territorial Decentration and Some of the Related Key Terms and Concepts

In view of the restricted nature of this investigation, it is proposed to define, solely from an operational standpoint, some of those key concepts and terms that will be frequently used. Nevertheless, most of the definitions advanced are by no means exhaustively comprehensive in coverage because the present researcher is aware of the fact

that in ordinary life, different people often attach different meanings to the same words, concepts or terms, depending on the respective situational conditions in, or purposes for, which those words, terms and concepts are being used. It is thus with the sole aim of avoiding such confusion that the following brief attempt to state, as explicitly as possible, the operational meanings of some of the key concepts and terms used in this study is being undertaken.

II.2.a The Concept of Territory

From this writer's personal experience, it has become evident that the term "territory" is used by various people at different times to mean and/or describe different phenomena.[1] For example, in such competitive team sports and games as rugby or soccer, while team A strives to protect its own "territory" or "physical ground and air space" of the playground against encroachment by opposing team B, team A also pushes forward to gain control of team B's playing territory. This battle goes on until such a time as team A has either registered a score or is forced to retreat into its own half by team B. Through some careful observation of the behaviour of some domestic or wild animals, birds or sea-creatures in their respective habitats, or indeed by watching such television programmes as the "Life on Earth" series, which was presented for the BBC, or reading the book, by David Attenborough (1981), one can notice the extent to which some of the species of these creatures struggle to demarcate "territorial" boundaries, police and protect their "territories" or places of abode and livelihood against any possible form of aggression and colonisation. Hence, the occurrence of such descriptions as "octopus territory" in the open sea, "monkey or tiger territory" in the tropical forests and "eagle or hornbill territory" in the sky. In view of the above, and given that the concept of territorial decentration is derived from this popularly used term, the need to establish the operational meaning of the "concept of territory" within the general framework of this study cannot be overemphasised.

While it would seem plausible to accept the view that in general geographical terms, the "concept of territory" refers to "terrestrial space occupied and utilised by man and other related biotic phenomena", as

some of the examples cited above helped to illustrate, it is also instructive to refer to Stoltman's (1971, 1976) attempts to define that concept. In his comprehensive review of literature on territorial concept development, Stoltman (1976b 3-15) maintained that the concept of territory appears regularly at three perspective levels, namely, the geographic, psychological and geographical education and/or the related social or environmental studies.

According to Stoltman (1976b: 3-4), while geographers are generally interested in the 'territorial perspective or way of viewing man's spatial or territorial organisation' (Abler et al., 1971/77; Broek (1965); Chorley and Haggett (1963/70, 1967); Haggett (1965); Masser and Brown, 1978), and whereas earlier philosophers and travellers compiled their reports in terms of philosophical and experiential conceptualisations of territory (for example, Aristotle (1921), Ibn-Khaldūn (1958) and Strabo, 1917), the concept of territory is used in political geography to describe 'those lands peripheral to and owned by the national state' (Hartshorne: 1950, 1954; Jefferson (1917); Ratzel (1896, 1969) and Stamp, 1966). This concept is also regarded as a key variable in geographic research either on the perception of the environment, when it is viewed in form of neighbourhoods, districts and boundaries (Saarinen: 1966, 1969, 1970, 1976; Tuan, 1977; Walford, 1973a), or on cognitive mapping (Downs and Stea: 1973, 1977; Gould and White (1974); Hart and Moore, 1973; and Oatley, December, 1974).

In terms of Piagetian psychology, the concept of territory refers to the child's cognitive-affective and emotional attachment to a local area, or what one can call "local patriotism" (city and/or canton: Geneva and/or Vaud, in Switzerland) in relation to the home nation or "the concepts of a nation" (Switzerland) and "nationality and/or nationalism" (Swiss) (Piaget, 1928; Piaget and Weil, 1951). However, and as Stoltman (1976b: 4) argued, this research is not concerned with the child's nationality attachment in the affective or emotional sense; it will confine itself to studying the Kenyan African children's spatial or territorial cognition of political territories and their relationships. To this end, past psychological research will only apply to this investigation by virtue of the kinds of political territories

and measurement tasks incorporated in the assessment of the concept of a nation and, correspondingly, of international understanding.

The concept of territory is also used in geographical education and the related programmes of social or environmental studies. Stoltman (1976b: 8-10) pointed out that while such early writers as Comenius, Ritter and Pestalozzi used it to expound their "geographical" ideas, and whereas the beginning of the 20th Century witnessed a strong influence of the German practice of Heimatkunde, or the use of "local environs" as a medium for teaching and learning geography in schools, "regional surveys", field observations and map representation have for a long time been the common tools of teaching and learning geography at various levels in Britain and France (Dickinson, 1970; Rice, 1966). There is also some evidence to show that in East Africa, the practice of using "regional surveys" has been given some considerable emphasis (Boorman, 1971; Lwanga-Lukwago: 1973a, 1979). Stoltman (1976b: 8-9) cited further evidence to show that in the U.S.A., though the "local studies" practice prevailed at the primary grades gradually becoming the "expanding environment curriculum" at the upper elementary grades, (Fraenkel, 1969; Hanna et al., 1966; Imperatore, 1970; Jarolimek, 1967; and Taba, 1967), and though the interest in observation and visual training as subjects of research persisted (Pattison, 1970), nevertheless, the emphasis upon field experience was not maintained.

II.2.b Decentration

This term is used in Piagetian psychology to describe the process of expanding the territorial or spatial perspective of the child (Piaget, 1928; Piaget and Weil, 1951). In this study, it will mean: 'the act of extending one's territorial or spatial perspective or world progressively outwards from the centre' (Stoltman: 1971, 1976), as opposed to the process of "centration" or the 'act of centring' (Child, 1977: 122; Gove, 1969; Piaget, 1970c: 711).

II.2.c The Concept of Territorial Decentration

This is 'the waning of unconscious egocentricity' (Piaget and Weil, 1951; Piaget and Inhelder, 1956/67). Put differently, it is the process through which one is expected to broaden one's centre of spatial

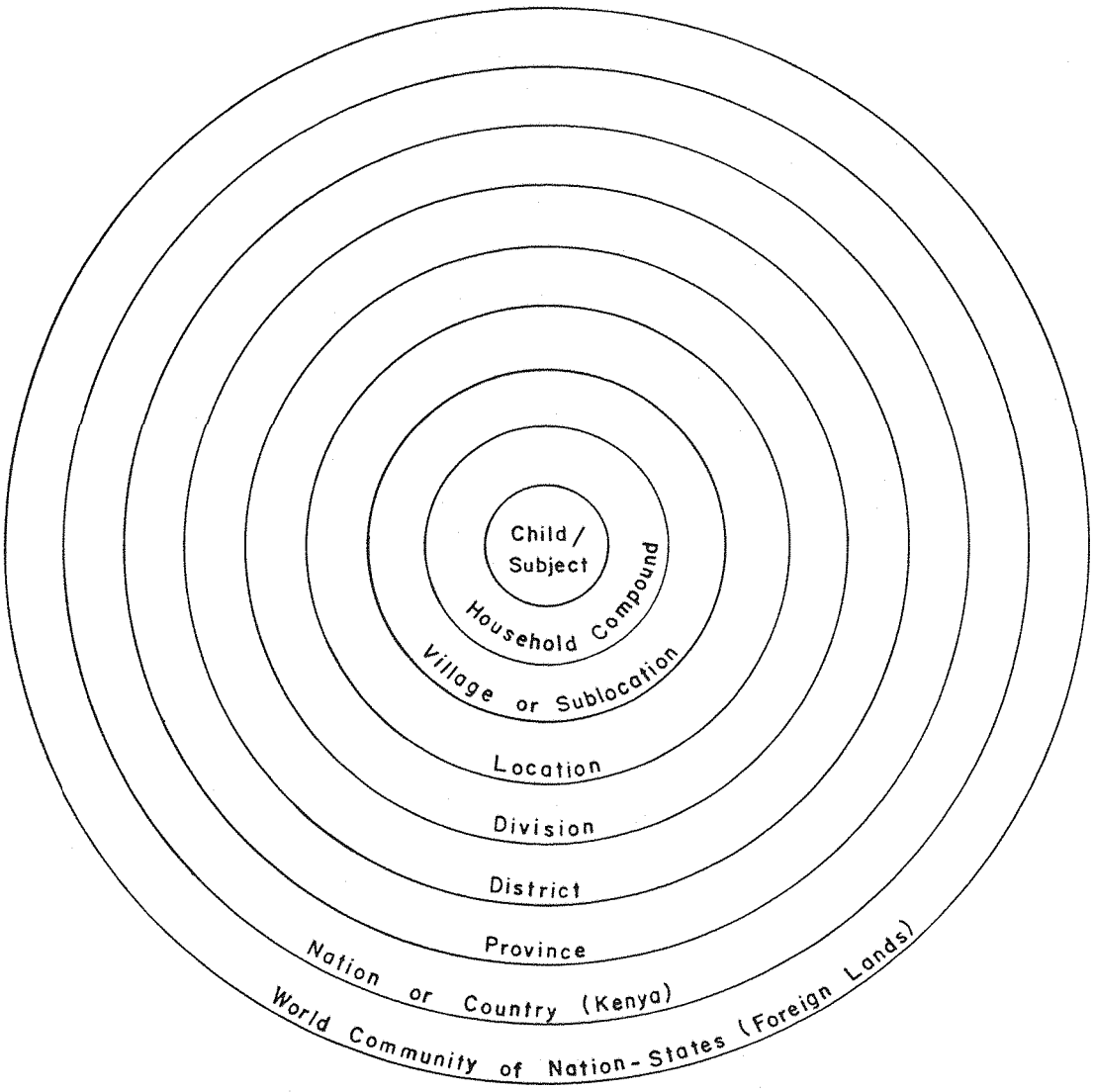


Figure II·1: A concentric model illustrating the process of progressive territorial decentration by the child or subject from the self-centred or egocentric household compound to such broader geo-political territories as the nation and the world community of nation-states. See also: Kimilu, 1975, page 5.

Source: Author.

FIGURE II.1

or territorial interest progressively from the self-centred or egocentric self, house-hold compound and family environments to such decentred geo-political territories as the village or sub-location or immediate local neighbourhood, location, division, county or district, town, province, city, nation and the world at large, as illustrated in Figure II.1, page 57. A concentric model which seems similar to the one presented in Figure II.1 was used by Kimilu (1975: 5) in his attempt to view, geographically, such complex cultural influences as emerge from the interaction of experiences in human (socio-economic, political and religious) relationships on a school child's educational development in Ukambani, or the Machakos and Kitui Districts of the Eastern Province of, Kenya (see Figure IV.2, page 61). However, this author noted that the levels of location and division were omitted in Kimilu's (1975) model.

In this study, therefore, 'a territorially decentred subject or child' will be one who has acquired the operational notions or concepts of county or district, town or city, country or territory or nation, and an understanding of other related territories or nations and points of view through progressive decentration from egocentricity to reciprocity. This subject should achieve the maximum score on the "Territorial Decentration Test", which operationalises the concept of territorial decentration, and should thus be classified in Territorial Decentration Stage III.

II.2.d Egocentricity

This is what other researchers have called 'egocentrism' (Aebli, 1967; Garner and Plant, 1972; Omari: 1972, 1975, 1977; Sigel and Cocking, 1977). It describes the tendency towards self-centredness and a general lack of perception of the concerns and feelings of others. Thus, an 'egocentric subject or child' is one who displays an inability to distinguish between his own viewpoint and that of another (Garner and Plant, 1972: 80).

II.2.e Physico-eco-cultural environmental and residential experience (PEERE)

This term is used to describe those diverse experiences and life styles acquired and retained by this study's individual subjects who were born,

live and/or go to school in those geographical regions of Kenya whose physical, ecological and cultural or sub-cultural landscapes seem to be characteristically different. As will be described in greater detail in Chapter IV.3.2.b.v, pages 212-213, and as Figure IV.11, pages 231 , 232, shows, these regions are:

i. the metropolitan urban landscape (Nairobi City and Districts, Nairobi Province) (Region 1);
ii. the high plateau, or the so-called "parallel ridge and valley plateau", a sub-humid, densely populated and usually forested environment, which is occupied dominantly by the traditionally rural, sedentary agriculturalists (Kiambu District, or "the peri-urban region", Central Province) (Region 2); and
iii. the undulating plain of low rainfall, low population density, and fairly-open grassland environment (or the so-called "Masai Steppe"), which is mainly inhabited by the traditionally rural, semi-nomadic herders (Narok District, or "the remote rural and open environment", Rift Valley Province) (Region 3).

II.3 The Problem and a Statement of the Research Questions

Geography is one of the fields of study that commands a central position in the curricula of the institutions of formal education in Kenya. At the primary school level, the current practice is to teach geography through the inter-disciplinary approach as part of the programmes of either social or environmental studies. Though to date geography is being offered as a single subject in most of the post-primary educational institutions, attempts are being made to extend the integrated studies approach to the lower secondary school (Forms I and II) level through the auspices of the African Social Studies Programme (ASSP) and the related Environmental Science Education Projects (for example, see ASSP: undated mimeograph, 1971a and 1971b). The activities of these programmes are based at the Kenya Institute of Education headquarters in Nairobi. This Kenya Institute of Education is a Ministry of Education parastatal organisation charged with the responsibility of controlling, amongst other activities, matters relating to the innovation, planning, development, implementation, evaluation and renewal of school curricula throughout the Republic of Kenya.

The problem of the changing aims of geography teaching and learning, and of the subject's status in, and contribution to, the educational curricula of a number of countries has been discussed in greater detail elsewhere (Ambrose, 1973: 69-70; Graves: 1975, 1980; and Lwanga-Lukwago, 1978). For example, Archibald Geikie (1887) maintained that geography helps to develop the learners' powers of observation and reasoning by enabling them to understand the scientific method of acquiring knowledge. Arguing that geography, as a subject, helps to bridge the gap between the natural sciences and the humanities, and that it is a science whose main function is to trace the interaction of man in society and so much of his (physical) environment as varies locally, Sir Halford Mackinder (1887) wrote thus:

> ... it is the duty of the geographer to build one bridge over an abyss which, in the opinion of many, is upsetting the equilibrium of our culture. Lop off either limb of geography and you maim it in its noblest part.... (The Scope and Methods of Geography, 1887: 26).

According to Graves (1975: 83), the view held in France is that the subject contributes to the students' moral development by teaching them to be tolerant of others through an understanding of these other people's struggles, ways of life, beliefs and perception of their natural and man-made environments. In addition, there are two other closely-related aims of the study of geography with which this research is particularly concerned.

The first of these two aims is that the study of geography helps one to consider and understand the complexities of the processes and patterns of spatial or territorial or areal organisation, differentiation and distribution of the physical, biogeographic and human (socio-economic) phenomena of the environment through the use of certain spatial concepts (Abler et al., 1971/77; Allen, 1971; Ball et al. 1971; Gould 1969b; Haggett, 1965; Hart and Moore, 1973; Hartshorne, 1959; Marsh, 1966; Masser and Brown, 1978; May, 1970: 178-248; and Tuan, 1977). To underline the importance of this broad aim of geographical study, for example, Abler et al. (1971/77) dealt with such themes as order, science and geography, in which the philosophical and scientific background to the origins of the thought system used by geographers

FIGURE II.2

is outlined; the measurement, relationship and classification of phenomena in the world; the locational behaviour and spatial interaction, under which the bases for spatial interaction, movement, transport systems, location of human activities and the location and use of land are discussed; the spatio-temporal diffusion processes; the normative and descriptive frameworks underlying individual spatial decisions leading to, and/or explaining, the spatial organisation of phenomena which are both induced physically and by man; the unsolved problem of "the best or optimum location" and the attempts to deal with the problem; the trends for, and problems of, future spatial organisation; and finally, the future of geography within the spatial organisational tradition.

In another related instance, Allen (1971: 16) argued that geography is a "tradition" which is expressed through repeated empirical and theoretical studies centring on interpretations of information derived from territorial experience. Thus, through this territorial experience, geographers, who always seem to be striving to answer the question "where?" (and one might add the question "why there?"), add considerable insight to the analysis of such spatio-temporal locational patterns as are created by man. According to Allen (1971: 16-17), the four traditions, which occupy the centre, of geography as a discipline (namely, man-land, area studies, spatial and earth science, as illustrated diagrammatically in Figure II.2, page 61) are held together by territorial experience. This territorial experience permeates each of the named traditions while concomitantly serving as a medium through which interdisciplinary study may occur with other fields of inquiry.[2]

The significance of the aim of geographical study that has just been described above and the geographic approach to the study of some aspects of environmental resource planning, controlled exploitation and conservation seems to have been given increased emphasis through the auspices of the UNESCO and I G U 's Commission on Geographical Education (UNESCO and Graves, 1975: 114). A survey carried out by this writer of the various Kenyan school syllabuses in geography and related subjects revealed that considerable attention is given to this aim of geographical study. For example, and as shown in Appendix II.1, page 437, and Appendix II.2, page 438, the New Primary Geography

Syllabus (1975: 1), which replaced the 1967 Geography Syllabus, states, amongst others, the following objective of primary education and aims of the study of geography, which seem to fit conveniently within the context of the general aim of geography under discussion, thus:

> Objective 2: To help the child to develop awareness and understanding of his environments.
>
> Aim 1: By a systematic study of the local area, to build up an understanding of man's relation to his environment.
>
> Aim 2: To create visual impressions of life and conditions outside the immediate environment.

At a similar level, the Kenya Primary School History Syllabus (1973: 1) includes the following objective:

> Objective 1: To study the people and events of the past which are important for an understanding of the way in which people live and behave today (see Appendix II.3, page 439).

At the secondary school (Forms I and II) level, the following two aims in geography, amongst others, can be cited:

> Aim 1: To give an understanding of the fundamental concepts and ideas of geography and the techniques and methods used in studying it.
>
> Aim 2: To develop an understanding of the factors affecting spatial distributions and of patterns formed by those spatial distributions

For the Kenya Certificate (Ordinary level) Geography 273 Syllabus, one can cite the following interrelated aims:

> ... To prepare the pupil for service to his country by:-
>
> i. making him aware of his immediate environment;
>
> ii. helping him to acquire the appropriate attitudes and skills with which to interpret and develop that environment, including those of recording, analysing and synthesising the observations that have been made; and
>
> iii. helping him to acquire knowledge and understanding of the relevant aspects of the larger environment in which the community and country exist by selecting topics of particular applicability to his studies and to the environment in which he lives.... (Kenya National Examinations Council (formerly the East African Examinations Council): Kenya Certificate of Education (O-Level) Regulations and Syllabuses, 1979, Nairobi, page 49.

For the Kenya Advanced Certificate of Education (A-Level), the P250 Geography Syllabus includes the following aim: 'to help all students to understand and appreciate the geographical background to the development and contemporary problems and prospects of East Africa, Africa and the rest of the world' (Final Draft of the K.A.C.E. (formerly the E.A.A.C.E.) P250 Geography Syllabus, 1979, Nairobi).

Within the 1970-80 decade, the aim described above and the related instructional strategies seem to have gained greater popularity and emphasis as a result of the establishment of the headquarters of the United Nations Environmental Programme (UNEP) in Nairobi, Kenya's metropolitan capital.

The origin of the second aim of geographical study, upon which this investigation also focusses attention, and one that is considered to be one of the most important in the geography curricula in Kenya, is attributed to James Fairgrieve (1926), who contended that:

> The function of geography is to train future citizens to imagine accurately the conditions of the great world stage and so help them to think sanely about political and social problems in the world around.... (Thus) a good geographical training cannot fail to engender sympathetic understanding of other folks in other lands....

Scarfe (1950, 1978) seems to have reiterated Fairgrieve's observations by emphasising, inter alia, the view that geography should be taught 'so that the ideas of and the wish for international understanding naturally arise in the minds of children'. This view seems to have been held by Graves (1975: 82) when he noted that 'geography may be taught to reinforce the concept of a nation, especially in the newly-independent states', a description which would certainly apply to Kenya.

With particular reference to Kenya, there is ample evidence to show that this second geography aim is incorporated in the national educational curricula. In the first instance, the Gachathi Report (1976a: 3-5) of the National Committee on Educational Objectives and Policies in Kenya identified, amongst many other important issues, the creation and promotion of national unity and international consciousness as outstandingly important overall national objectives Kenya must

continually strive to achieve and uphold.[3] The report further called for the development of appropriate educational programmes in all formal and non-formal educational institutions through which the objectives stated earlier should be developed and inculcated amongst the citizens of Kenya. Additionally, given the diversity of Kenya's physical and ecological environment, population composition and opportunities for resource development, as distributed throughout her eight provinces (Ogendo, 1972), the apparent further need for developing educational curricula that help to cultivate amongst the citizens a sense of belonging to, and a desire to serve, the nation of Kenya and a capacity to view Kenya as a member of the world-wide community of nation-states cannot be overemphasised (see also Sifuna, 1975). Correspondingly, the need for school geography and geographical education curricula developers to identify and examine, inter alia, influences upon the performance and progress of Kenyan learners cannot be overstated.

It is within this general framework, therefore, that, for example, the Kenya New Primary School Geography Syllabus (1975) carries, as its preamble, a clear statement of the six national goals of education, as outlined in Appendix II.4, page 440-442. Of particular relevance to this discussion are goals 1 and 6, which respectively deal with the issues of "national unity" and "international consciousness". Furthermore, three of the six aims of teaching geography in Kenyan primary schools, as stated in the syllabus, are designed to make a contribution towards the achievement of the two national goals referred to above. These aims, which are also quoted in Appendix II.2, page 438, are:

Aim 2: To create visual impressions of life and conditions outside the immediate environment.

Aim 4: To develop an understanding of the interdependence of the peoples of the world.

Aim 5: To develop an understanding of the developments taking place in Kenya, Africa (and other parts of the world).

At the secondary school level, K C E Geography 273 Syllabus aim Number (iii) and the one stated for the K A C E P250 Geography Syllabus on page 64 illustrate the importance attached to this second aim of the study of geography in Kenya.

The need for further research in geographical education was stressed by Bacon and Kennamer (1967: 43-44) who argued that one of the great chasms of ignorance awaiting bridging through empirical research was the question: 'How can the curriculum be organised so that political entities can be comprehended at a variety of scales (for example, local, community, county, state, nation, global and so on)?'. In addition to this, and extending the invitation of the psychologists to geographers and geographical educationists to examine the way in which the concepts needed in geography are tied to those represented in such other disciplines as mathematics, the physical sciences, language arts, the fine arts, history and economics, Almy (1967 b: 38) had this to say:

> I hope that the geographers in planning for research in geographic education would attempt a dual analysis involving, on the one hand, the ideas involved in geography, and on the other, the mental operations needed to grasp them. I should like to see less emphasis placed on how early a particular idea can be taught and more on the nature of its intellectual underpinnings...

Thus, it was apparently in response to this invitation that the 22nd International Geographical Congress, held in Canada in 1972 under the auspices of the International Geographical Union (I G U , which is a parastatal organisation of UNESCO), instituted a geographers' group to be responsible for furthering research in the interface between psychology and geography. It was proposed that this kind of research would help to improve the practice and performance of the teachers of geography by throwing more empirical light on certain aspects of geographical education. One of the research problems subsequently identified by the group, and with which this investigation is particularly concerned, was 'to find out the extent to which Piaget's evaluation of children's conceptions of the relationships between territories of different sizes (for example, in Switzerland: town/city, canton and country) could be shown to be valid (or not valid) among children of other countries, and what would the findings of such studies imply for the geography curricula of the countries concerned' (Graves, N.J. in Stoltman, 1976b: v).

Evidence from a survey of literature revealed that, as a result of the invitation mentioned above and the related challenges, a substantial

amount of research along the lines suggested has been carried out in various countries by geographers, geographical educationists and others interested in the problems outlined. In this regard, one should note, for example, the various research endeavours in such fields as cognitive mapping (Abler et al., 1971/77; Downs and Stea: 1973, 1977; Gould: 1965, 1969; Gould and White, 1974; Hart and Moore, 1973; Kaplan, 1973; Oatley, 1974) and environmental perception (Kaplan, op. cit.; Saarinen: 1966, 1969, 1970, 1976; and Tuan, 1977). Of particular relevance to this research are the following studies, whose self-explanatory titles can be found in the bibliography, pages 373-435: Oliviera (1976) in Brazil; Renshaw (1979) in Botswana; Carnie (1966, 1972), Jahoda (1963, 1964), Jahoda and Tajfel (1965), Jaspars et al. (1965), Lunnon (1969), Marsh (1966), McFarlane-Smith (1964), Sandford (1970), Satterly (1964, 1977), Taylor (1960) and Towers (1974) - in Great Britain and parts of Western Europe; Dodwell (1963), Towler (1965, 1969, 1970), Towler and Nelson (1968), Towler and Price (1976), Laurendeau and Pinard (1970), Satanek (1971) and Stoltman (1971, 1972, 1976) - in North America; and Cowley and Murray (1962) and de Lemos (1974) - in Southern Africa. Most of these studies reflect attempts to replicate Piaget's (1928, 1947) theory of global stages, Piaget and Inhelder's (1956) spatial tasks and Piaget and Weil's (1951) research in Switzerland on the children's concept of territorial relationships to test how and at what age subjects from different cultural environments conceptualise space and territory. Put differently, these studies seem to have aimed at testing the universality, generalisability and comparability, or the lack of them, of Piaget's theory of global stages and the associated characteristics across a variety of cultures. Of necessity, while the adopted original Piagetian research instruments were adapted to improve on their relevance and appropriateness for application in the different cultural environments in which the respective studies were carried out, some additional geographical tasks were also designed and incorporated in some of these subsequent replication and related studies to ensure the maintenance of the link between the psychological and geographical content areas.

In East Africa, several cross-cultural psychological studies, including those replicating some of Piaget's work on conservation, classification,

seriation, and spatial conceptualisation, have been carried out by some cognitive developmental, and educational, psychologists (for example, Arap-Maritim, 1979; Dasen: 1979a, 1979b, July, 1980; Dasen, Berry and Witkin, 1979; Dasen and Heron, 1980; Dasen, Ngini and Lavallée, 1979; Eshiwani: 1974, 1980; Kiminyo, 1973; Mureria, 1974; Mureria and Okatcha, 1977; Mwangangi, 1974; Mwaniki, 1973 and Okatcha, 1977 - in Kenya; Omari 1972, 1975, 1977; and Nyiti: 1973, 1977 - in Tanzania; Igaga, 1974 and Otaala: 1972, 1973 - in Uganda. However, evidence of similar attempts by geographers and geographical educationists to study the problems associated with children's acquisition, development and application of territorial or spatial concepts is so far difficult to find.

The current attempts being made in Kenya to modernise and localise the general content and scope of the geography syllabuses at the national primary and secondary school levels are noteworthy. This author has made some contribution towards these attempts through his professional career as a school geography teacher, curriculum developer, examiner and teacher-educator. These continuing efforts to innovate, develop, implement, evaluate and renovate curricula are recommended for support by the Gachathi Report (1976b) and the Kenya 4th Development Plan for the period 1979 to 1983: Part I, pages 152-191. Nevertheless, evidence available so far suggests that no real attempt has been made to investigate, inter alia, the problem of the development of the concepts of space and of territorial decentration with particular reference to the school geography and, by implication, the geographical education curricula in Kenya.

Accordingly, a number of questions suggest themselves for investigation in this research. These are:

1.a. By what processes and stages are Kenyan African children able to acquire the concept of the nation-state in its spatial aspects?

b. What are some of the factors which influence the processes and rates of the development of territorial decentration in Kenyan African children?

2. What are the main implications of the possible answers to the questions stated above for the planning, implementation, evaluation and renewal of the curricula in school geography and in the geographical education and training of student teachers in Kenya?

II.4 An Outline of the Origin and Evolution of the Concept of Territorial Decentration through a Critical Review of Pertinent Literature

In Sections II.2.a to 2.c of this chapter, reference was made to the fact that a fairly detailed and comprehensive review of literature on the concept of territory in the geographic, psychological and geographical education fields of study was carried out by Stoltman (1976b: 3-15), and some of the major relevant investigations in the three named fields of study were also noted. In this section, therefore, interest will be focussed on tracing the origin, and outlining the evolution, of what is now known as the "concept of territorial decentration" through a critical review of the selected major studies that have so far investigated a variety of aspects of this concept. This survey will help to provide the necessary background of the purposes of this research.

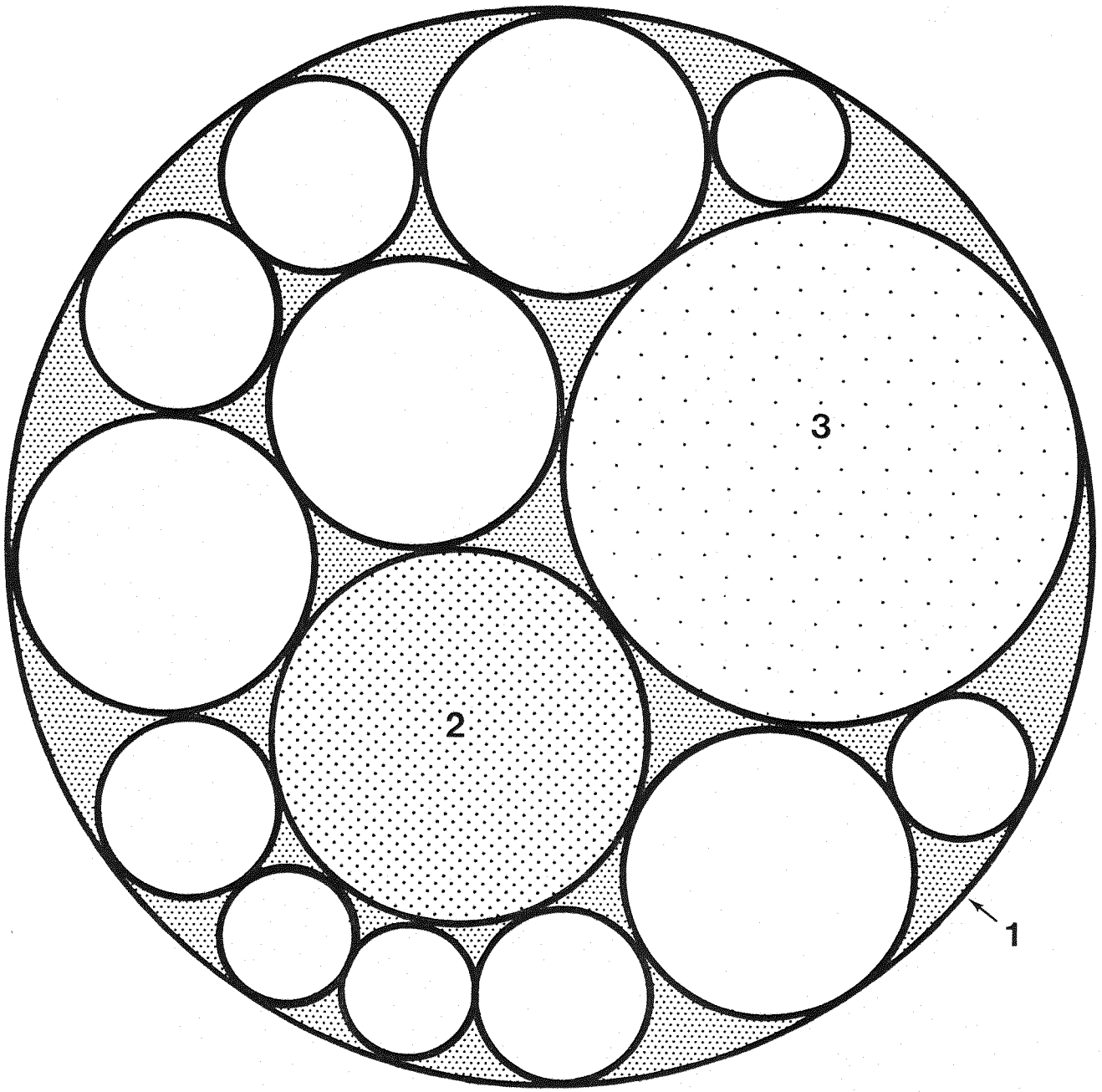
As part of a major original study of Judgment and Reasoning in the Child, Piaget (1928) also investigated the "growth of relativity in ideas and notions", in which section he incorporated, inter alia, a study of "some definitions of the ideas of family and country (or kinship and nationality concepts) given by boys aged between 7 and 10 years".[4] In this initial study of territorial conception or territorial decentration in Swiss school children, Piaget (1928: 113-134), who was mainly concerned with the development of verbal intelligence and not with concrete or practical intelligence (that is, that which is directly brought into play by observation of the external world), reported an inability amongst his subjects to create a schema with the correct territorial relationships. While some of the subjects, especially those aged less than 9 years, denied the possibility of being both Swiss citizens and members of a Swiss city (Geneva) and/or canton (Vaud) all at the same time, even those who accepted the fact that they were both Swiss and Genevan or Vaudois did not apparently 'understand how a part inserted into a whole really forms part of the whole, and that a man

who is fixed inside the part remains nonetheless within the whole' (Piaget, op. cit.: 120).

Piaget (op. cit.: 121) illustrated the persistence of this failure to understand the logical relationship between the three territories by drawing a large circle containing several smaller circles, as shown diagrammatically by this investigator on page 71. However, Piaget did not specify the exact measurements for each of the circles. He then informed the subject that while the biggest circle (1) stood for Switzerland, one smaller one (2) represented Geneva and the other one (3) stood for Vaud, a canton adjoining Geneva. The child was also told that by being in the small circle, one is also in the big circle. On being asked, while the child (Bel, who was aged 9 years and 2 months) responded that to be Genevan was also to be Swiss since the smaller circle (2) was inside the larger one (1), he also revealed a misconception that one could be both Genevan and Vaudois since the two smaller circles (2 and 3) were inside Switzerland (1). For Bel, while Geneva was in Switzerland, it did not, however, form a part of Switzerland; Bel juxtaposed territories but did not connect them. As noted above, Piaget attributed this misconception to the child's failure to grasp the schema of "the relation of part to whole" or the lack of an understanding of the relationship between the three circles.

In consonance with his theory of global stages, which was outlined in Chapter I, and according to the observations made above, Piaget (1928: 121-125) postulated that the evolution of the concept of country is marked by three sequential spatial stages, namely:

Spatial Stage I, which occurs in children aged less than 7 years, is one in which the elements of country or nation, town/city and province or canton or district are represented with approximately equal magnitude in the child's reasoning. These elements seem to be mutually exclusive, with the one being of dominant force depending upon the individual subject. Usually unaware that Geneva or Vaud are both in Switzerland, the child aged less than 7 years juxtaposes the three territories. According to Piaget (op. cit.: 123), while nearly 75 per cent of the children in his sample, where size was not specified, were able to say that Geneva is in Switzerland, that country or territory was



Circle **1**	Switzerland
Circle **2**	Geneva
Circle **3**	Vaud
Other Circles	Other territories (cities or cantons)

Source: Author

Figure II.3 A diagrammatic representation of Piaget's (1928:121) description of an illustration he offered his subjects to identify their ability to understand the schema of the logical relationship between territories in Switzerland using a series of circles.

still imagined as being situated "further away" than the cantons due to the unusually strong habit of juxtaposition which was displayed by the subjects interviewed.

Spatial Stage II, which tends to occur in children aged between 7 or 8 and 10 or 11 years, is characterised by the contention that while the town and canton or province or district are located in the nation, they do not form part of it. Thus, though Switzerland surrounds Geneva and Vaud, the latter two territories do not really "form part of" the nation of Switzerland. This reflects the conflict existing in the child's reasoning between the tendency to juxtaposition and the relation of part to whole.

Spatial Stage III, which is attained at the age of 10 or 11 years, marks the advent of correct schematisation; the child makes the correct territorial and logical relationship between nation or country, town or city, and canton or province or district. To quote Piaget's (op. cit.: 125) example, 'A country, says Wi (10; 10), is the whole of cantons, and Geneva forms part of Switzerland. One can be Genevan and Swiss at the same time'. Thus, the idea of homeland or nation becomes a reality in the child's mind. As Stoltman (1976) put it, 'this stage is characterised by the decentration of political territories to the national level' (page 6).

The second major study of the child's concept of nationality, or understanding of the concepts of town and country, was that undertaken by Piaget and Weil (1951) at the invitation, and on behalf, of the United Nations Organisation, apparently as a direct result of the Organisation's and Piaget's post-World War II interest in the question of nationalism. For this study, Piaget and Weil (1951) interviewed over 200 Swiss or foreign European children living in Geneva and whose age varied from 4 or 5 to 14 or 15 years. The two aims of this study were:

a. to enquire whether, in view of their particular method of development, the cognitive and affective attitudes associated with loyalty to the homeland and initial contacts with other countries may not be at the root of subsequent international maladjustments (tensions); and

b. to investigate why the child, as he grows, does not acquire enough objectiveness and understanding of others, or readiness to give and take, to withstand those influences for tension or maladjustment that are brought to bear upon him in adolescence or adult life (Piaget and Weil, op. cit.: 561).

As was the case in the first investigation (1928), this study followed a verbal interview schedule and the subjects were asked to make some pictorial responses (drawing circles or closed figures).

As a result of their interview, Piaget and Weil (1951: 563-565) discovered that:

a. The children aged below 5 years had only a simple concept of the territory in which they lived. Though they were conscious of their home and town or city, and had some knowledge of such specific characteristics as the approximate size (small or big) and the major language used in the area (French, German or English), they also displayed some illogical extensions and applications of those characteristics to such larger territories as the canton and state. It was not until the age of 5 or 6 years that the subjects developed the verbal notion that "Geneva is in Switzerland".

b. The subjects attained "spatial stage I" at the age of about 6 or 7 years. Between that age and 7 and 8 years, though the children maintain that "Geneva is in Switzerland", they still view the two territories as being comparable. Thus, they so juxtapose the territorial units that Geneva is alongside Switzerland in the pictorial representation exercise. In a logical or territorial sense, these children do not seem to understand that Geneva (the part) is part of and is in fact inside Switzerland (the whole). This is due to lack of logical inclusion ability in the child's thought.

c. During "spatial stage II", occurring between 7 or 8 and 10 or 11 years, the subjects develop the notion that "Geneva is enclosed spatially in Switzerland" and they actually draw the small circle (Geneva) inside the larger one (Switzerland). Despite this correct territorial relationship, children could not as yet match the spatial enclosure with a systematic logical inclusion of one category within

another; they often thought of Switzerland as being a large circle separate from the small circle (Geneva). 'The homeland is still only an abstract notion: what counts is the town, or the family, and the statement heard there; but the children do not yet synthesise these statements into any coherent system' (or territorial schema) (op. cit.: 565). However, since the children tend to show an inability to make logical distinctions (for example; the idea of spatial or spatio-temporal inclusion is accepted, but not that of the inclusion of one class of ideas in another) and an inability to make affective distinctions so that the different conceptions are reduced to a single emotional factor, that of family tradition, these children's responses were thus termed "bipolar" by the two researchers. Nevertheless, the beginnings of the processes of logical decentration, which enables the child to subordinate his territory (town/city or canton/province/district) to a larger unit in which it is enclosed; and concurrently, of affective decentration, which enables him to subordinate his otherwise egocentric motives to collective values beyond his personal interests, were noted. The attainment of total decentration and integration of territories is restricted by the inability to differentiate due to the persistence of some egocentricity in the new field of consciousness which the child might have mastered recently (Piaget and Weil, op. cit.: 567).

d. Spatial Stage III is not only attained at the age of about 10 or 11 years but is also characterised by the children's ability to synthesise their notion of local territory (town/city or canton/province) and homeland or nation or country correctly. Put differently, the idea of the nation becomes a reality in the child's mind and this development is attributable partly to the cognitive correlation of territories (inclusion of the part (city or canton) in the whole (nation)), and partly to the affective or emotional factors which seem to be implicit in socio-centricity, or to a combination of both of these elements. The child at this stage is able 'to attain to a scale of values culminating in relatively abstract virtues (for example, Michelle, G., aged 11; 5, says: "I like Switzerland because it is the Red Cross country. In Switzerland, our neutrality makes us charitable"), and to succeed in integrating spatio-temporal and logical relationships into the invisible whole formed by the nation or the country, or the (so-called)

'parallelism between the processes of logical decentration or integration, on the one hand, and affective or ethical decentration or integration, on the other' (Piaget and Weil, op. cit.: 567).

Thus, Piaget and Weil (1951) concluded that, firstly, the child's cognitive, affective or emotional and geographical discovery of his national homeland and understanding of other countries is a process of gradual and systematic transition and decentration from unconscious egocentricity to reciprocity. Through this decentration process, and as was noted earlier in this chapter, the child broadens his centre of territorial interest from the otherwise egocentric levels of home and family to the town or city, state or district or province, country or nation, region and the world community of nations. Secondly, this gradual development of the concept of territorial decentration, which does not start until the age of about 6 or 7 years, is liable to constant setbacks, which are usually caused by the re-emergence of egocentricity on a broader or sociocentric plane, at each new sequential stage in this development, or as each new conflict arises. Thirdly, and as was observed for the earlier study (Piaget, 1928), and indeed in line with his theory of global stages of the development of the structures of human thought, Piaget and Weil (1951) prescribed three sequential and invariant stages described above for the child's development of the concept of territorial decentration and specified the age(s) at which each of these stages is attained.

Despite the innovative nature and significance of the foregoing two initial and related investigations of the development in children of the idea of the homeland (nation) and of relations with other countries, and whereas Piaget and Weil (1951: 578) concluded their study by suggesting that 'the main problem is not to determine what must or must not be inculcated in the child; it is to discover how to develop that reciprocity in thought and action which is vital to the attainment of impartiality and affective understanding', these two researchers apparently failed to identify and discuss several critical issues which may be considered to be fundamental in carrying out such empirical studies as these two to the satisfaction of some modern scientific requirements. In fact, as outlined below, these shortcomings seem to have been responsible for the breakdown of Piaget's system of "nationality"

stages, according to Jahoda (1964: 1092).

Firstly, though the reader is provided with long and detailed verbal accounts describing the interchanges between the experimenter(s) and a selection of subjects, and while the two researchers' intensive but unstandardised questioning always followed a definite plan, Piaget (1928) and Piaget and Weil (1951) failed to publish their interview schedules in a systematic format. As a result, such subsequent researchers as Jahoda (1963, 1964), Marsh (1966), Stoltman (1971, 1972, 1976) and the present investigator, seem to have been left with the arduous and time consuming task of reading through the long textual accounts, and sometimes vague descriptions, of the two original experiments and related procedures before undertaking their replication studies.

In the second instance, and as Jahoda (1964) observed, Piaget's (1928) original method had been too dependent upon verbal communication. This was, however, corrected in the second (Piaget and Weil, 1951) study in which attempts were made to observe the children's actions in relation to physical and manipulable objects while trying to establish the nature of the children's cognitive relations to these wider aspects using language as a tool. It can thus be argued that by doing this, the two researchers were forced to fall back on the "pre-operational" method (Jahoda, 1964: 1081).

Thirdly, and in relation to the first shortcoming, while the two researchers' use of an intensive but unstandardised method of questioning had the advantage of flexibility, which enabled the interviewer to pursue the child's or subject's line of thought and assess its implications, this method had the drawback of rendering it difficult, if not impossible, to compare the responses made by the different children in the research sample. This shortcoming has somewhat serious implications for Piaget's attempts to formulate clear-cut stages, as shown below.

Fourthly, and as Jahoda (1964: 1081-1085) discovered, Piaget's (1928) and Piaget and Weil's (1951) spatial stages were later found to be inapplicable due to a number of interrelated factors. The first one,

which is related to the third shortcoming discussed above, is the ambiguity of Piaget's criteria for determining his spatial stages (Jahoda, 1964: 1084). It was noted that while Piaget and his associates formulated their clear-cut stages, probably after some intensive scanning of the research material, unfortunately, they also tended to assign these stages to rather broad age ranges, often taking little or no account of the various factors responsible for individual differences in the stages attained by their research subjects. Related to this observation is the fact that whereas Piaget provided age equivalents for the postulated stages and was careful to clarify that the age ranges tend to overlap one another, he seems to have failed to publish the distribution of children in the three stages by age in his two studies. The second factor is the apparently invalid assumption by Piaget that development proceeds necessarily from the comprehension of "spatial" (tacitly equated with "geographical") relations to that of "nationality" ones. Thirdly, Piaget and his co-workers seem to have held the mistaken view that failure to handle nationality relations is primarily due to inability to make logical class inclusions before the ages of 10 or 11 years. Yet, according to Jahoda (1964: 1090-1092), many children are capable of dealing with part-whole relations at a much earlier age. A possible source of this error was attributed to the fact that since Piaget and his co-workers used such physically manipulable objects as beads, for which the classes are well-defined perceptually, though again the child is not sufficiently mature to handle this relation correctly, that child could not be expected to cope adequately and correctly with such a highly abstract class as "nationality", whose boundaries are not related to any physical cues and, as such, remain vague and uncertain.

As a result of these four major weaknesses of the two studies undertaken by Piaget (1928) and Piaget and Weil (1951), subsequent researchers took measures, firstly, to modify the original methods used in the initial two investigations in an attempt to make these methods as scientifically rigorous and quantitative in nature as possible. Secondly, it was also considered necessary to introduce more standardised but flexible approaches to interviewing the research subjects than was the case in the original studies. Finally, attempts were made to

devise and use more appropriate "geographical" or "decentration" stages than Piaget's and his co-workers' "spatial" or "nationality" stages by carefully taking into account the various factors considered to be responsible for the individual differences in the stages achieved by the various research subjects. However, all these considerations were additional to the basic objectives stated by the subsequent researchers for their respective investigations.

The first attempt to replicate Piaget's (1928) and Piaget and Weil's (1951) studies of the development of the children's ideas about country and nationality, with some of the outlined modifications, was that of Gustav Jahoda (1963, Parts I and II, 1964), a British psychologist. Jahoda's main aims were:

a. to analyse the gradual emergence of concepts and relationships, and to offer tentative developmental norms for children of contrasting socio-economic background (1963-I: 47);

b. to explore more subtle aspects of national consciousness and to outline the broad developmental trends and the socio-economic group differences emerging from both parts of the study, using a specially devised picture test (1963-II: 143); and finally,

c. to examine the stages in the development of ideas of country and nationality postulated by Piaget in the light of empirical findings obtained from Scottish children (1964: 1082).

In a nutshell, Jahoda (1963, 1964) aimed at defining the general age at which Scottish children could realistically comprehend the territorial relationships of their expanding environment.

Having attempted to apply Piaget's three spatial stages unsuccessfully, Jahoda (1963-I: 48-51, 1964: 1082-1089) assigned the children in his sample to four "geographical (G)" stages he had devised from verbally formulated relations made in response to "what " and "where" questions about a series of geographical entities (Glasgow, Scotland and Britain). According to Jahoda (1963-I: 49-51), the four "G" stages, and some of their main characteristics, are:

Geographical (G) Stage I, which is characterised by a general lack of conception of Glasgow as a unitary whole. Children at this

stage view Glasgow as a vague entity nearby, which may not include their immediate geographical location (street or local village). Asked the question: "Where is Glasgow?", subjects in this category gave such answers as: "It is beside the playground, in street X" (W6[5]); It's up by the park there - you go round the corner" (W6); "Down in Y avenue (M7) (op. cit.: 49). Though the subjects at this stage knew the term "Scotland", they showed a complete lack of logical differentiation such that Scotland and Glasgow were viewed as one and the same entity. On the other hand, some of the subjects saw Scotland as existing somewhere outside of Glasgow. There were others who advanced such random associations as dancers and kilts to questions about Scotland. Lastly, Britain was regarded as a remote place which some people visited and there was ample evidence to show that most of the subjects had no conception of Britain.

Geographical (G) Stage II witnessed the subjects' conception of Glasgow as a territorial unit, and a display of the general lack of the development of the concept of Scotland as part of Britain. Thus, when asked the question: "Where is Glasgow?", most of the subjects answered: "It's here, where we are". However, the question: "Where is Scotland?" attracted G-1 responses - 'Scotland is "in England" or "part of America" (both M6)' (op. cit., 1963: 50). The significant developmental change displayed by these subjects was confined to the consolidation of the concept of Glasgow as a territorial unit in which one lives, thus constituting one's immediate geographical location or environment.

Geographical (G) Stage III, which was described as a temporary transitional stage between G-I and G-IV (ibid.: 51), is characterised by the child's vocabulary bypassing the logical representation of Glasgow, Scotland and Britain. Thus, though most of the subjects had acquired the concept of Glasgow as part of Scotland, they had neither the conception of Scotland as part of the British Isles, nor could they conceive of Britain as a national territorial unit in which Scotland and Glasgow were found. Given that some subjects gave such answers as : "Scotland is a country. It's in the world. Britain is really the whole continent" (M8); or "Scotland is a country. It's beside Wales and Ireland. Britain is mostly called Great Britain;

it's sort of Scotland - another name for it" (M8), Jahoda (1963-I: 50-51) concluded that most of these answers were parrot responses. They helped to reveal the fact that these children lacked any real understanding of the meaning of the term Scotland that they so frequently verbalised.

Geographical (G) Stage IV is the final level at or during which most of the subjects showed evidence of having achieved the normal adult comprehension of Britain as a well-defined territorial entity. This stage is characterised by such logically acceptable responses as the following: "Glasgow is in Scotland. Scotland is a country in Great Britain. Britain is some countries joined together" (M6); or "Glasgow is in the Central Lowlands of Scotland. Scotland is a country. It's just north of England. Britain is Scotland, England, Wales and Northern Ireland" (W11) (op. cit.: 51). Thus, "the Glasgow-Scotland/England-Great Britain territorial relationship" is expressed correctly by the subjects.

Jahoda (1963-I: 51-55; 1964: 1083-1089) also analysed his results comparatively in terms of Piaget's spatial stages, investigating the relative influence of age, sex and socio-economic class upon the development of urban Scottish children's ideas about country and nationality. He drew his random sample of 144 Scottish children, aged between 6 and 11 years, from 4 urban schools in Glasgow: 2 schools in a well-to-do middle-class district (M) and 2 in a high-density dilapidated working-class district (W). In contrast to Piaget's and his co-workers' original method of using circles to represent political territory, Jahoda developed a task which required the subject to manipulate 4 physical props. These props were: 1 small brass disc, 2 white pieces of plastic and 1 large black piece of plastic, which represented, respectively, subject/Glasgow, room/England and/or Scotland, and the school or Great Britain[6]. The relative placement of the props by the subject was used to ascertain the verbal responses almost in the same way as the circles were used by Piaget and his co-workers (1928, 1951).

Jahoda (1963, 1964) thus reported that he found a significantly greater degree of territorial decentration among boys than among similarly aged girls; a difficulty for younger children to display clear understanding

of such concepts as "town" and "country" or, put differently, an increasing relationship with age between the subjects' verbal description of the territorial relationships and those children's ability to represent these territorial relationships using the above-named props; a significant difference between children from urban schools located in the middle-class and working-class districts of Glasgow, especially amongst those aged between 8 and 10 years, with respect to both geographical and spatial stages; and finally, that the child's intellectual grasp of his environment extended gradually outwards like a series of concentric circles, with the child himself at the centre, as cognitive development continued.

Any attempt to examine critically Jahoda's (1963, 1964) studies and the findings he reported should begin by acknowledging the positive measures he took to improve on Piaget's and his co-workers' original studies. To this end, the present writer notes Jahoda's (1963-I: 49) cautious observation that while the criterion measure he (Jahoda) adopted involved the use of the so-called "natural" units for the purpose of categorisation, or assigning subjects to the different stages and that whereas this measure could not completely eliminate 'the element of arbitrariness entailed in the slicing up and pigeon-holing of what is essentially a continuum', as might have been the case in the original Piagetian studies, it nevertheless tended to reduce that arbitrariness. The second positive feature of this study is that, in contrast to Piaget and his associates, Jahoda tried to investigate the relative influence of the socio-economic status, and to some extent, of the age and sex, of the children upon the subjects' development of the concepts of country and nationality. However, whereas Piaget and his co-workers, on the one hand, and Jahoda, on the other, both credited the non-school environment and travel experiences with much of the child's territorial decentration, they all failed to make any allowance for differing intelligence in the children. Secondly, Jahoda (1963, 1964) seems to have overlooked the significance of stating the specific measurements of the props he used instead of just describing them in such simple qualitative terms as colour (white or black), material used (brass or plastic), and relative size (small or larger). Lastly, one can also criticise Jahoda for having concentrated his effort on testing and

interviewing an exclusively urban sample while, it can be argued, the inclusion of some subjects from the Scottish rural environment around Glasgow might have yielded some interesting comparative results. Despite these few shortcomings, Jahoda's (1963, 1964) work was sufficiently substantial to constitute some evolutionary transformation of the body of research-work on the concept of territorial decentration.

The second replication study, which was apparently omitted in Stoltman's (1971, 1976) otherwise comprehensive survey, was undertaken by Jennifer Marsh (1966) in Scotland. This investigator's broad aim was to find out whether, in contrast to Jahoda's attempt, rural Scottish children were more advanced than urban children of comparable age, intelligence, and socio-economic parental status in their understanding of what is meant by the following territorial units of a city/town (Aberdeen/Montrose), a country (Scotland/England) and a nation-state (Great Britain). She wanted to discover specifically whether a rural environment helps the child to develop these concepts more readily than the urban landscape.

Marsh's (1966) randomly selected research sample of 84 subjects was comprised of 42 urban and 42 rural 9-year-old Scottish children, drawn respectively from a school in the city of Aberdeen and from the country districts in Aberdeenshire and Kincardineshire.[7] This sample was matched for age, socio-economic parental status and intelligence. To match for intelligence, she administered to each group in each school the NFER Sentence Reading Test I, which was developed by A.F. Watts. While matching for socio-economic parental status was achieved by using the British Registrar-General's Classification of Occupations, the age of the children in the sample was kept constant by selecting only those subjects who were 9 years old.

Her data-collecting instrument consisted largely of short, standarised individual interviews, each containing two sections, namely:

a. The Verbal Interview Schedule, whose aim was 'to investigate the child's verbal understanding of the town in which he lived, or that nearest to which he lived in the case of rural children, the country in which he lived, the concept of Great Britain' (Marsh, 1966: 24), was basically a replication of Piaget's and co-workers' studies (1928, 1951).

However, the proper nouns of Aberdeen or Montrose, Scotland/England and Great Britain in Marsh's (1966) study replaced respectively those of Geneva, Vaud and Switzerland used in the original studies. The new territories corresponded to those of Glasgow, Scotland/England, and Great Britain, which were used by Jahoda (1963, 1964). To score the subjects' responses on this test, Marsh used Jahoda's (1963, 1964) four categories of Geographical (G) Stages, namely:

G-I: No concept of Aberdeen as a unitary whole;

G-II: Conception of Aberdeen as a unitary whole, but no conception of it as part of Scotland;

G-III: Conception of Aberdeen as part of Scotland, but not of Scotland as part of Great Britain; and

G-IV: The correct expression of the Aberdeen-Scotland/England-Great Britain relationship

b. The Spatial Test, which had been developed by Jahoda (1963), was then administered to each subject in the sample to avoid purely verbal misunderstanding, and to ensure that the subjects made correct verbal responses which they could also justify by making correct manipulations of the symbolic props representing the various territories. This test was divided into two parts:

Part I: The Training Phase, which was designed to acquaint the subjects with the symbolic representations used in the main test. Prior to introducing the verbal questions, the subject was presented with two plastic board rectangles and a small metal button.[8] The subject was then asked to arrange the props to represent the school building, the room in which the test was conducted and the subject himself in that room. As Marsh (1966: 27) reported, help at this stage was given to those subjects who could not work out these manipulations successfully (that is, 26.2 per cent of the rural and 40.5% of the urban, children in the total sample).

Part II: The Main Test, in which all the 3 pieces or props of plastic board and the metal button were given to each subject individually. The subject was then asked to arrange them to represent Britain, England, Scotland and Aberdeen, with the largest piece representing the largest territory (Great Britain).[9]

Using the original Piagetian (1928, 1951) method, which had again been adopted and modified by Jahoda (1963, 1964), Marsh (1966: 28) categorised the responses of her research subjects into the following spatial ("S") stages:

S-I: Failure to grasp the "Aberdeen within Scotland" and "Scotland/England within Great Britain" relationships; or in cases where Great Britain had been omitted, the "Aberdeen within Scotland" and "England-Scotland" relationships;

S-II: All the relationships outlined in S-I above are grasped, but the orientations are incorrect; and

S-III: All the territorial relationships and their orientations are correct.

Marsh (1966: 28-29; 30-42) then used the Chi-Square method of statistical analysis 'to test whether any significant difference existed between the number of cases reaching the higher stages of both verbal and spatial understanding in rural as compared with urban areas'. Thus, she was able to report that:

a. Rural children were both significantly more advanced than urban children of comparable age, intelligence and socio-economic status of the parents, in developing the concept of a town as a unit within a country, and in the development of spatial concepts concerning the part-whole relationships of Aberdeen/Montrose-Scotland/England-Great Britain;

b. Some children, especially of low verbal intelligence and low socio-economic parental background, had developed the spatial concepts under investigation though they could not express the relationships verbally;

c. A disturbingly high proportion of children showing an apparent understanding in the verbal tests had no real idea of the spatial concepts involved;

d. A few subjects, who had not developed the concept of a town as a unit, could name other towns correctly, thereby showing evidence of verbal knowledge without real understanding;

e. While the rural subjects in the sample were not significantly more advanced than the urban children in developing the concept of

Great Britain, where school learning could be expected to play a more important part than environment, the rural children were slightly, though not significantly, better than their urban counterparts at naming other towns, again where school learning could be expected to play a more important part than environment (Marsh, op. cit.: 43-51). She thus concluded that while 'a rural environment does help the child to develop spatial relationships...., the conception of Great Britain is dependent upon teaching rather than the development of spatial concepts' (ibid.: 5).

The significance of the contribution made by Marsh's (1966) study towards an improvement of the understanding of some aspects of the development of the concepts of town and country or territorial decentration can neither be underrated nor doubted easily. Nevertheless, any attempt to extrapolate information from her study has to be undertaken cautiously due to a number of reasons. Firstly, the age of the subjects in, and the size of, her sample were too restricted. Given that her findings apply only to 9-year-old rural and urban Scottish school children, one can ask whether similar observations could be made about rural and urban subjects in the respective age-brackets below and above nine years. Correspondingly, one may also find it difficult, if not impossible, to determine the rate of development of the concepts of town, country and nation amongst these 9-year-old subjects. Perhaps, it would have proved more worthwhile to include in the sample children whose ages varied somewhat to allow for the determination of the rate of development across different age ranges.

Secondly, by concentrating, quite correctly, on investigating the relative influence of the different cultural (rural and urban) landscapes upon the children's development of the concepts of town and country, which was itself an improvement over Jahoda's (1963, 1964) study, Marsh (1966) was able to conclude that a rural environment tends to enhance the development of these spatial relationships. However, whereas this approach would seem appropriate in such a dominantly urbanised environment as that of Great Britain, one could still argue that some additional and more interesting results might perhaps be obtained by placing an equal emphasis on the examination of the relative influence

of different physico-ecological environmental experiences in the subject's development of the concepts under investigation.

Finally, and as was the case with the three earlier studies (Piaget (1928); Piaget and Weil, 1951; Jahoda: 1963, 1964), while Marsh (1966) described and presented diagrammatic illustrations (to scale) of, the materials (props) used in her investigation, she made no attempt to specify the exact measurements of these materials anywhere in her research report (1966).

At this stage, this writer considers it essential to summarise the findings of a series of studies which dealt with some aspects of the problem of the development of territorial decentration, but were also not covered in Stoltman's (1971, 1976) review of pertinent literature. The first amongst these investigations is that of John Carnie (1966, 1972), who examined the development of national concepts in junior school children and the children's attitudes to other nationalities. Carnie seemed convinced that school geography can make some 'important contributions towards fostering a realistic understanding of the world, without which children's ideas of certain key lands may remain deficient and of their peoples become distorted' (1972: 133). He particularly identified two key problems which affect 'the growth of international and inter-racial attitudes among children, namely, that the affective characteristics of the young child may interfere with his cognitive development and make it difficult for him to approach an objective understanding of his own group in relation to others; and (secondly) that, though most junior children pass on to a stage where they are at least prepared to recognise the similarities and accept the differences of foreign peoples, subsequently in adolescence, pressures are towards conformity to a more distrustful view of other nations and races' (Carnie, 1966: 6; 1972: 132-133). Though he was prepared to admit that the factors affecting the children's individual attitudes are bound to be complicated, Carnie (1972: 122) suggested that some of these are personality and intellectual ability, home characterictics and community background, the mass media, and school and classroom experiences.

Another study was undertaken by Jaspars, Van de Geer, Tajfel and Johnson (1965) to explore some aspects of international attitudes of children in different Western European countries and of various ages. This study was parallel to that carried out by Jahoda and Tajfel (1965) to investigate the emergence of national concepts and attitudes in British children, but to which the present writer unfortunately failed to gain access. Thus, the observations made here refer mainly to Jaspars' and associates' (1965) study, which was conducted in the Netherlands and consisted of three related experiments. While the first experiment was concerned with relations between the perception of nationality in a series of photographs of adult Englishmen and the preference for these persons, the second one investigated the relations between similarity judgments of six countries (America, England, France, Germany, the Netherlands and Russia) and the preference for these countries. The last experiment dealt with the perception of international relations between the six countries, in relation to the similarity judgments and the preferential choices with regard to these countries. The sample, which was stratified according to age, religion and socio-educational level of the children, was comprised of 120 Dutch children who were chosen from 6 elementary schools in Leiden.

As a result of their three experiments, Jaspars and his associates (1965: 48-49) reported that:

a. Though in the first part of the study, a correlation was found between the preference for other persons and the judgment of their nationality, as measured in a series of photographs, nevertheless, this correlation did not change significantly with age, nor were there any significant differences between boys and girls, between catholic, protestant and "non-denominational" children and between children of higher and lower socio-educational level;

b. In the second part, while the relationship between the preference for 6 countries and the perceived similarity between these countries was significant, the prediction that those children who were highly "prejudiced" in the photograph study would also show a stronger relationship in the second study between preference and perceived similarity of the 6 countries was not borne out; and finally,

c. In the third part, the perception of international relations did not only change remarkably with increasing age, but it was also related to the preference rank-order of the 6 countries used in this series of experiments.

While this study yielded some interesting results which seem to have a relevant bearing on the problem currently under investigation, it did not study the original Piagetian concepts; but only attempted 'to investigate national stereotypes and international attitudes in children in a new way' using the experimental materials described above (Jaspars et al., 1965: 48).

At this stage in the present survey, it should have become apparent that much of the research work on the development of territorial decentration and the related aspects was dominantly what this author would term as "eurocentric" in the sense that most of the studies had hitherto taken place in West European countries, including Great Britain. However, this phenomenon of "eurocentric monopoly" was short-lived because, as Stoltman's (1971, 1976) survey shows, interest in this research problem was emerging gradually across the North Atlantic amongst some North American psychologists. This development in the evolutionary history of research work on the concept of territorial decentration was highly significant as the beginning of the "cross-cultural perspective"[10] in the study of the development and importance of the concept.

According to Stoltman (1971, 1976), though several of the American psychologists examined ideas similar to territorial decentration, the earlier studies incorporated no attempts to investigate the original Piagetian concepts. The first of these North American studies to be reported was conducted by Deutsch and his co-workers (1967) who, while contending that normal kindergarten or first grade (year one of primary schooling) children should be expected to know the name of their town or city, actually discovered that disadvantaged first-grade children normally do not have this information, and that even if these children were to be exposed to territorial information, there was no guarantee that they would conceptualise territory. Furthermore, and in contrast to Piagetian theory (1928, 1951) and Jahoda's (1963, 1964) contention that such non-school environmental factors as the social

class and travel experiences account for much of the child's territorial decentration, Deutsch and his associates (1967) found that migrant workers' children who had crossed the nation (U.S.A.) numerous times in search of arable farming work failed to display territorial decentration. Lavatelli (1970) confirmed this observation by maintaining that these children had minimal knowledge of the places and areas through and to which they had travelled. Mugge (1963), who dealt with second grade children with above average intelligence and from above average socio-economic parental background, reported that these children found difficulty in keeping cities, states and countries in their correct territorial relationship. She also concluded that the children in her sample had learned relatively little from family travel experiences (op. cit., 1976: 8).

It was not until the beginning of the 1970-1980 decade that research work on the problem of the development of territorial decentration experienced another major positive evolutionary change. This happened in 1971 when Joseph Stoltman undertook the major task of attempting to consolidate the conceptual and theoretical frameworks of the geographers and psychologists and thus further research on the development of the territorial concept in an American sample of children. While the specific objective of Stoltman's (1971) study, which is reported in summarised form in Stoltman (1976b: 1-15; 39-58), was 'to test the comparability of Piaget's spatial stages to the development of the concept of territory in an American sample of children', he also sought to examine the relative influence of a number of variable factors in those children's development of this concept.

One of the most significant features of Stoltman's research is that not only did it incorporate the original Piagetian concepts and those of Jahoda, but it also took account of most of the recommendations for positive improvement of the research materials, methodology and procedures that had been made up to 1971 by the investigators discussed so far in this chapter in the field of the development of territorial decentration and the related concepts. To this end, therefore, and in conformity with the requirements of empirical test of theory, Stoltman (1971) designed and developed 4 individual evaluation tasks, including the basic Piagetian concepts and spatial stages, to constitute

what was then called the "Territory Conception Test, which was used to operationalise the development of territorial concepts in a sample of American children. This instrument, which has since then been modified and standardised by Stoltman under the new title of the Territorial Decentration Test,[11] was adopted for use, mutatis mutandis, as the main criterion instrument for the present research. As will be discussed later in greater detail, the main purpose of this instrument is to test the subjects' development of territorial decentration and of the concept of territory and the comparability of Piaget's spatial stages to that development. The 4 main sub-tests and their purposes are, briefly:

Sub-test A: Verbal Territorial Identification, which will help to assess the subject's verbal knowledge of territorial titles and familiarity with map representations of these territories;

Sub-test B: Verbal Territorial Relationship, which will be used to determine the subject's conception of the relationship of one territory to another verbally;

Sub-test C: Territorial Inclusion using Written Symbols will help to ascertain the presence, or absence, of logical territorial inclusion principles in the subjects' reasoning; and, finally,

Sub-test D: Territorial Inclusion using Props will be used to test the subjects' development of the concept of territorial relationships through the performance of several operations, and their ability to explain and justify their decision through the prop-placement process.

In line with these objectives, Stoltman (1971) examined the relationship between grade (school class or standard or form), sex, race (in terms of the socio-economic status of the parents) and urban-rural residence, on the one hand, and on the other hand, the American children's development of territorial decentration in relation to Piaget's theory of spatial stages. He randomly sampled 204 American school children, aged between 6 and 12 years, from 10 elementary schools, which were located in 6 school districts and served both the urban (6) and rural (4) communities in the State of Georgia, U.S.A. To allow for the testing of the hypotheses, Stoltman (1971) stratified the sample of 204 children in 4 ways, according to grade level (1-6), which was

controlled by the graded structure incorporated within the school structure; the rural-urban residence level, which was determined by the type of general population the school served; race (black-white), which was based on the proportionality of race information provided by the school administrators; and sex (female-male), which was determined according to information about the sex ratio of the school population as supplied by the school authorities. Stoltman selected and trained 4 research assistants to help in the administration of the research instrument. These interviewers were all doctoral degree candidates and had school teaching experience. Unlike Piaget (1928) and Piaget and Weil (1951), Stoltman (1971) subjected his research instrument and methodological procedures of hypotheses testing and data analysis to an apparently rigorous treatment of a wide range of statistical techniques.

As a result of his experimental investigation, which incorporated some more rigorous and standardised procedures than the earlier studies, Stoltman (1971, or 1976b: 47-52) reported that:

a. Since a significant difference ($p < .001$) was found between the hypothetical Piagetian spatial stages and territorial concept development of American sample of children used in the study, Piaget's spatial stages did not therefore fit the American children's development of the concept under investigation;

b. Analysis of variance of mean scores on the Territorial Decentration Test showed that no significant difference existed between the sexes;

c. Though a significant difference was found between the black and white subjects, this difference was probably attributable to the socio-economic status of the parents rather than the effect of race;

d. No significant difference was found between the urban and rural children in the sample;

e. Since a correlation of .536 ($p < .01$) was found between age and the development of the territorial concept, it was concluded that the two variables were significantly related;

f. The discovery of a correlation of -0.484 ($p < .01$) between

the socio-economic status of the parents and the development of the territorial concept led to the rejection of the seventh hypothesis in the null form, and thus, to the conclusion that the two variables were significantly related;

g. Consequent upon computing the multiple correlation of the independent variables of age and socio-economic status, on the one hand, and the dependent variable territorial concept development, on the other, it was found that the named variables were significantly related (the multiple correlation found was 0.709 with $p < .01$), and that the two independent variables accounted for 50 per cent of the variance in the development of the territorial concept in the sample of American children; and, finally,

h. As a result of computing the average item difficulty for each of the 4 territories to determine the conceptualisation difficulty through the use of both verbal and prop manipulation responses, it was discovered that while the children conceptualised the "state" territory to the greatest degree, they nevertheless found the "county" to be the most difficult to conceptualise, followed by city-town and nation, both of which tended to have approximately the same difficulty. According to Stoltman (1976b: 52), these observed conceptualisation difficulties were at variance with Piaget and Weil's (1951) and Jahoda's (1963, 1964) observations, which seemed to indicate a tendency towards a somewhat consistent decentration of territory and conceptualisation difficulty.

In conclusion, Stoltman suggested that the various observed incongruities between Piaget's theoretical spatial stages and the territorial stages development of a similarly-aged sample of American children could be attributed to such factors as differences in methodology and data collection; variations in data analysis; characteristics of the sample and sampling techniques; and the cultural differences between the American and Swiss children. He also made an interesting speculative observation that in view of the possibility of some children in the general population failing to attain territorial decentration stage III until about 15 years of age, and given the fact that a few adolescents may still not achieve this stage by that age, despite the influence of the school curriculum which would otherwise

ensure the attainment of this stage in most cases, it would seem certainly reasonable that a theory of territorial stages should include older subjects (Stoltman, 1976b: 51). However, it will be recalled that according to the Piagetian theory of spatial stages, subjects are expected to attain decentration stage III at about the age of 10 or 11 years. It would thus be interesting to see whether the results obtained from a study of the development of territorial decentration in Kenyan African children can throw some more light on this "end-point developmental" problem.

That Stoltman (1971, 1976) contributed significantly to a further improvement of the understanding of the problems associated with the development of the concept of territorial decentration amongst individual subjects across cultures may not be easily discounted. In addition to developing a fairly reliable, flexible and standardised research instrument (with specific prop measurements and descriptions), which can be used in various cultural situations, mutatis mutandis, to operationalise the measurement of the development of territorial decentration, Stoltman, op. cit., examined, and reported on, the relative influence of a wide range of variable factors in the development of territorial decentration amongst his sample of American children. However, and taking into acocunt his suggestions for further investigation, one can still identify several relevant aspects to which Stoltman did not pay much attention in his research.

Firstly, although Stoltman (1971, 1976), like Marsh (1966), incorporated an examination of the relative effects of the urban and rural residential experiences of his subjects upon their development of territorial decentration, and in fact reported that there was no significant difference between those children's performance on the criterion task, he seems to have overlooked the importance of investigating the relative influence of the different physical and ecological environmental experiences in the development of that concept. While such a consideration as this would have necessitated selecting the subjects in the research sample not only from the typically urban and rural cultural landscapes but also from those environments whose physiography and ecology are fairly different in character, the present writer failed to

find evidence to show that Stoltman (1971, 1976) took this experiential factor into account. Yet, as will become evident in the next chapter, the importance of physico-ecological, and cultural, environmental or residential experience in the development of territorial decentration and related concepts cannot be altogether neglected.

Secondly, while this author discovered some evidence which shows that one's ability to develop territorial decentration successfully may be partly dependant upon one's level of spatial concept development or spatial ability and one's effectiveness of spatial judgment, as will be discussed in Chapter III, Stoltman (1971, 1976) did not examine the relationship between these variable(s) and the development of territorial decentration in his sample of American children.

Thirdly, the survey of related literature revealed that a substantial amount of research information in the field of cognitive styles of psychological differentiation has been collected since the 1950s by such workers as Witkin (1950, 1967, 1969, 1972, 1978); Witkin et al. (1962/1974); Oltman (1968); Witkin and Berry (1975); Witkin et al. (1973); Berry (1976) and Witkin and Goodenough (1977b). Evidence from these studies indicates that certain processes of differentiation, especially perceptual differentiation, may play an important part in explaining the nature and trends of the development of territorial decentration amongst a given research sample. Nevertheless, Stoltman (1971, 1976) did not investigate the relative influence of these variables in the development of territorial decentration amongst his sample of American children, as will be discussed in greater detail in the next chapter.

The second "cross-cultural" study of the development of territorial decentration was carried out between 1973 and 1974, in one urban location (Rio Claro) of Brazil, by Professor L. Oliviera, and was reported in Stoltman (1976b: 17-38). Replicating Stoltman's (1971) research, setting out to test Piaget's theory of spatial stages, and using the Portuguese-language version of Stoltman's Territorial Decentration Test, Oliviera (1976) drew a random sample of 224 Brazilian children (112 boys and 112 girls) from one urban public integrated school[12] (Professor Marciano Toledo Piza) in the city of Rio Claro, in the

State of Sao Paulo, Brazil. The research instrument was administered by 9 female undergraduate education student testers who had been selected and trained by Oliviera, and each child was interviewed and tested separately in a specially designated research room in the school. In addition to the basic objective of testing Piaget's theory of spatial stages, Oliviera (1976) also examined the relationship between the independent variable factors of age, sex and socio-economic status of the subjects, on the one hand, and the dependent variable of the development of territorial decentration, on the other. Using such methods and procedures as those utilised by Stoltman (1971) (that is, Chi-Square tests, analysis of variance, and the step-wise regression analysis), Oliviera (1976) also subjected the research data to some statistical treatment.

As a result, Oliviera (1976: 25-29) reported that:

a. As was the case in Stoltman's (1971) study in Georgia, the Chi-Square analyses in Oliviera's (1976) investigation suggested that the children in the Brazilian sample progressed through the stages of territorial decentration at a lesser rate than did the Swiss and foreign children observed by Piaget and his co-workers in Geneva. Thus, while 135 (60.27 per cent) out of the total of 224 children were in Stage I; 44 (19.64 per cent) were in Stage II; and 45 (20.09 per cent), were in Stage III. It was also observed that whereas all the 6-year-old children were in Stage I, and while all the 14-year-old subjects were in Stage III, the earliest age at which any subject attained Stage III was 8 years. Moreover, the passage from Stage I to Stage III was discovered to be not only uneven but also to continue slowly until age 11 when greater numbers of subjects moved to Stage III.

b. In agreement with the findings of the earlier studies which had examined the differences between the performance of boys and girls, and whereas no significant differences were observed in the Brazilian boys' and girls' performance in the different stages, no significant interaction between sex and stage was revealed by the analysis of variance;

c. While there were significant differences in the mean scores attained by the different age groups with those scores increasing as

age also increased, whereas the boys generally obtained somewhat higher scores than girls (girls tended to outscore the boys between the ages of 6 and 7 years; but beyond 8 years of age, the boys surpassed their girl counterparts), these differences were so insignificant that no significant interaction between age and sex was discovered. These findings about the influence of age apparently supported Piaget's and his associates' observation that while age plays an important role in the development of territorial decentration, it does not determine the passage from one stage to another;

d. Given that 66.52 per cent of the total research sample of 224 Brazilian children came from the lower upper class, neither significant differences in the scores attained by children of different socio-economic status nor a significant interaction of sex and socio-economic status were observed. The concentration of subjects in one socio-economic class made difficult the interpretation of socio-economic status as an influencing or non-influencing factor in the subjects' performance on the Territorial Decentration Test.

e. A step-wise regression analysis revealed that while age was the most important independent variable for explaining the scores on the Territorial Decentration Test, it was followed by socio-economic status and sex in that descending order of importance. The correlations of the three variables were significant at the .05 level.

On the basis of these results, Oliviera (1976: 17, 28-29) stated the major implications of this Brazilian study as being that:

a. Since the subjects in the Brazilian sample of children between the ages of 9 and 12 were found to be in Decentration Stage II, which, according to Piagetian theory, is a transitional stage, greater pedagogic efforts should not only be directed to the children in this stage but more attention should also be given to the use of operational tasks which focus on the notion of country - (for example, and in addition to the "part-whole" relationship, the "brother-sister", "right-left", "before or in front-between-behind" relationships). To achieve success in these areas, Oliviera recommended that it would be advisable for the teacher to determine the stage of development of children on mass, weight and volume conservation.

b. As the corroboration of decentration stages which follow the same sequence as cognitive development provides a basis for curriculum development in geography, the geography curriculum should complement territorial decentration by incorporating within its scope perceptual exploratory experiences especially for children in Stages I and II;

c. To ensure that pedagogy enhances the development of the concept of territorial decentration in children, while the notion of country should not be taught as an abstract subject without reference to other geographic areas and their spatial relationships, this concept of nation can, and should, be used as an integrating factor for the several subjects taught in the areas of environmental and/or social studies;

d. While the Territorial Decentration Test is a standardised, practical measurement tool that permits a quantification of the cognitive responses of the child, and one whose props can be easily prepared and used both as instructional materials that provide concrete experiences for the children, and as guidelines for developing operatory tasks that could serve as learning activities, this test can be used for classifying children in stages of territorial decentration, or for providing those favourable conditions in which the child can possibly construct, firstly, the notion of the relationships between the parts and the whole, and thereafter, the logical relationships between country, state, county and city.

e. Whereas the data apparently encourage the researcher to infer from the territorial decentration concept a world concept, and while the stages of territorial decentration could provide a model by which international understanding might be presented according to the child's development stage, study materials should be prepared such that they alert the teacher and student to the importance of territorial decentration for the comprehension of global interaction and understanding.

The results and stated implications of Oliviera's (1976) investigation, which replicated Stoltman's (1971) research on the development of territorial decentration and the corresponding Portuguese version of the main criterion test, are noteworthy and impressive. Nevertheless, these results and conclusions must be interpreted with caution due

to four main shortcomings.

Firstly, and as noted earlier, Oliviera's (1976) study was restricted in scope in the sense that while the investigation was conducted only in one urban location (Rio Claro), and despite the fact that the research sample of 224 was comprised of an equal number of boys and girls, aged between 6 and 14 years, this research sample was drawn exclusively from one public urban school (Professor Marciano Toledo Piza's School). This restricted sampling procedure did not provide the investigator with any opportunity for comparing and/or contrasting the study's findings with those that might have been obtained as a result of involving either some rural children or more than one school in the research.

Secondly, and as Oliviera (1976: 28) commented in self-criticism, though the data were subjected to analysis of variance procedures to determine if significant differences in territorial decentration were observed by age, sex and socio-economic status of the parents, and while it was not only discovered that there were no significant differences in the scores attained by the children of different socio-economic parental background but also that the interaction of sex and socio-economic status of the parents was not significant, the effects of this socio-economic parental status constituted a limitation to the study. This limitation was caused by the fact that the great majority of the children in the sample (66.52 per cent) were drawn from the "lower upper socio-economic class", and as a result, any interpretation of socio-economic parental status as an influential, or non-influential, factor in the children's performance on the Territorial Decentration Test is thereby rendered difficult.

Thirdly, just as all the earlier investigators seemed to have failed to examine closely the relative influence of the physical and ecological environmental-residential experience in the development of territorial decentration and the related concepts amongst their respective research samples, so did Oliviera (1976). Fourthly, and finally, as was noted earlier in this discussion, an attempt to investigate the relationship between any such processes of psychological differentiation and/or factors as spatial ability (or the effectiveness of spatial judgment), cognitive styles and perceptual ability,

on the one hand, and the development of territorial decentration, on the other, could possibly yield some interesting and instructive results. These results can prove helpful in throwing more light on the nature and trends of the development of those related concepts. Unfortunately, however, Oliviera (1976), like the earlier investigators mentioned in this Chapter, made no such attempt to examine the relative influence of those factors in the Brazilian children's development of territorial decentration.

Another study which is to some extent related to the present investigation is that of Omari (1977). In his study of cognitive egocentrism, Omari (1977) attempted an examination of the relative influence of age and cultural-environmental variables in spatial decentration among some Tanzanian children. Though he randomly selected a sample of 240 children from 3 primary schools in northern Tanzania (one in an urban area, another in a rural plain zone and the third in a remote rural area), it still seems apparent that he did not pay specific attention to an examination of the importance of the influence of differences in ecological environmental-residential experiences, as in Berry's (1971, 1973, 1974, 1975, 1976) "eco-cultural model" for psychological differentiation, in the Tanzanian children's development of spatial decentration.

Omari (1977) reported that while spatial sophistry or decentration increased as a function of age, environmental variations did not exert their effects on the subjects' performance as would be predictable from the previous studies on the effects of urbanisation on the acquisition of complex cognitive skills. A marked gap between his sample of Tanzanian African children and Piagetian norms obtained with children from industrial cultures was observed. Though the general performance of the Tanzanian children was relatively poor, the general Piagetian major stages of the development of spatial skills were also observed. He thus concluded that decentration as a developmental phenomenon seems universal, but cautioned that at the levels of theoretical conceptualisation of "egocentrism", there seems to be a need to relate the concept of egocentrism to much wider theories of inter-personal relations (for example, those of the "self" which were articulated by Mead, 1934).

Through the present author's personal enquiry, it was possible to establish the fact that this investigation is the first "cross-cultural" and replication study of the development of territorial decentration to be carried out in English-speaking Africa.[13] However, this writer was able to learn, not only from an intensive survey of literature but also from a personal communication from Stoltman (see Note 13) about the current status of research on the development of territorial decentration, that another study, which would replicate Stoltman's (1971, 1976) research, was due to be conducted in Nigeria, West Africa. According to Stoltman's communication, it was generally hoped that a successful completion of this East African investigation, and the proposed West African research, would yield some results which would help to form a basis for an improved comparative understanding of the cross-cultural aspects and problems of the development of territorial decentration.

In view of the preceding critical review of literature covering the origin and evolutionary aspects of the concept of territorial decentration (that is, from the original studies undertaken by Piaget and his co-workers in the 1920s through to the present time of 1981/82), and in contrast to some of the studies reviewed, this study will attempt to examine the relative significance not only of age/grade and differences in sex, but also those of the levels of spatial concept development (or spatial ability (differentiation)), the physico-ecologico-cultural environmental and residential experience, and the levels of logical reasoning, in the development of territorial decentration amongst a sample of Kenyan African children. Hence, the importance this writer attaches both to the methods and procedures of sampling the research subjects carefully from the different geographical regions of Kenya, as was explained briefly in Section II.2.d. above and as will be discussed below, and to the incorporation within the instrumentation process of this research of those tasks which will help to determine operationally the competence and performance levels of the research subjects in relation to their development of territorial decentration.

II.5 Purposes of the Present Study

On the basis of this critical survey of pertinent literature, which helped to establish and describe the current status of research on the development of territorial decentration, this research sets out to fulfil the following purposes through a replication and extension of some of the earlier empirical studies undertaken in some other countries to the Kenyan contextual situation:

1. To contribute towards attempts being made to acquire functional knowledge about the Kenyan African children's cognitive and logical development through an empirical investigation in the subject interface of Piagetian psychology, geography and geographical education in Kenya.

2. To provide a basis for understanding the processes through which, and the rates at which, Kenyan children acquire and apply the concepts of space and territorial decentration in order to develop spatial notions of the concept of the nation-state of Kenya.

3. To contribute towards an understanding of the relative significance of some of the factors which influence the development of the concept of territorial decentration, as determined according to the Piagetian theory of spatial stages (1928, 1951) and Stoltman's (1971, 1976) Territorial Decentration Test.

4. To attempt a comparison of the results of this study with the findings of similar earlier investigations to determine as far as is possible the universality and generalisability of the theories and tests developed and applied in those studies (for example, Piaget, 1928; Piaget and Weil, 1951; Piaget and Inhelder, 1956; Laurendeau and Pinard, 1970; Jahoda: 1963, 1964; Marsh, 1966; Satterly: 1964, 1977; Stoltman: 1971, 1976; Oliviera, 1976; and Omari, 1977).

5. To identify, state and discuss some of the implications of the major results of this research for the processes of the planning, implementation, evaluation and renewal of the curricula in school geography and in the geographical education and training of student teachers in Kenya.

II.6 The Nature or Type of the Investigation

Several authors have attempted to classify general educational research into various types, and to discuss the relative merits and weaknesses of each of these types of research (Borg and Gall, 1979; Burroughs, 1975; Evans, 1979; Kerlinger, 1973; Moser and Kalton, 1971: 211-237; Nisbet and Entwistle, 1970: 8-15). While Nisbet and Entwistle (1970) grouped all educational research into three major types (surveys, experimental designs and clinical or case studies), Borg and Gall (1979) identified and discussed in detail not less than nine types. In this short section, an attempt is made to define, and state the main purposes, advantages and shortcomings of, some of the major types of educational research identified by some of these authors. This attempt will provide a basis for determining the nature or type of this investigation.

The first, and probably the most common, type of educational research is "survey or descriptive research". According to Nisbet and Entwistle (1970: 8-9), surveys involve 'the observation and description of a situation as it is, without setting up experimental conditions or allocating groups to different treatments; the recording of information; and the use of tests, examining the distribution of scores, or the application of sophisticated techniques of measurement to contrasting groups which already exist within the educational system'. For Borg and Gall (1979: 27-28, 283-325), 'survey research typically employs questionnaires and interviews to determine the opinions, attitudes, preferences and perceptions of persons of interest to the researcher'. Kerlinger (1973: 410-423) argued that 'survey research (particularly "sample survey") studies large and small populations (or universes) by selecting and studying samples chosen from the populations to discover the relative incidence, distribution and interrelations of sociological and psychological variables. ("Status surveys", on the other hand, and in contrast to "sample surveys", aim at learning the status quo rather than studying the relations among variables)' (page 410). However, despite the use of survey research, this approach has two major limitations. Firstly, although a correlation may be found between any two variables, survey research does not generate evidence

with which to prove causality in the relations detected; one can only infer a causal link. As such, the survey method may contribute little to an understanding of the relative influence of a range of variable factors unless a complex statistical analysis is carried out. Secondly, both of the survey research tools of questionnaires and interviews are subject to bias due to the fact the way in which a question is asked often influences the responses.

The second type is "observational research", in which the technique of observation is used to gather data about the subjects involved in a study. According to Borg and Gall, op. cit.: 28-29, 283-325, the advantage of the observational process is that it enables the researcher to collect direct information about specific areas of human behaviour that can be collected only indirectly by such measurement techniques as paper-and-pencil tests. However, in designing observational research great care must be taken to eliminate "observer bias" and to avoid such faults as using broad general definitions of the behaviour to be observed, using subjective rather than objective methods of recording the observations, and requiring that the observer record more aspects of behaviour than can be attended to effectively. If these dangers are not taken into consideration, the validity of observational research can be greatly reduced.

"Historical research" is, according to Borg and Gall, ibid.: 29-30, 326-371, Kerlinger (1973: 701-703) and Chadwick et al., 1978, that type of investigation in which a researcher conducts a systematic search for documents and other sources that contain facts related to the researcher's questions about the past. Through this type of research, one can acquire some valuable insight into, and an understanding of, the way that present problems and practices in education have evolved. Carrying out historical research involves the use of primary sources, or documents (or oral traditional accounts) in which the individual describing the event was present when it occurred; and secondary sources or documents (or secondary oral traditional accounts) in which the individual describing the event was not present but obtained information from someone else who may, or may not, have been a direct observer. The use of these primary or secondary sources further involves both careful and systematic internal critical analysis, which itself

involves the evaluation of the probable accuracy of the statements obtained from the sources, and external critical analysis, which is concerned with questions of whether or not the source of information is genuine.

The fourth type of educational research is called "experimental designs". Nisbet and Entwistle (1970: 11-15) defined experimental designs as those involving 'the manipulation of the value of the independent variable, firstly, to introduce difference between the "control group" and the "experimental groups", which groups must have been made equivalent by "matching" or "random allocation", while remaining representative; and, secondly, to detect changes in the dependent variable by use of a pre-test and a post-test'. This definition is similar to that advanced by Borg and Gall (ibid.: 33-34, 519-555, 556-597) who, while maintaining that experimental research in education provides the most effective tool available for determining cause-and-effect relationships, also drew the reader's attention to the existence and possible uses of "quasi-experimental designs". According to these two latter authors, the main difference between the two sub-types of research is that, whereas 'in the true experiment it is possible to assign subjects randomly to the different treatments or experimental conditions, in quasi-experimental research random assignment for one reason or another is not possible'. Though quasi-experimental studies can provide valuable information, this information should be accepted with less confidence than that generated by the use of the true experimental design. These experimental research designs may be viewed as the equivalents of Kerlinger's (1973) "laboratory experiments" (pages 298-401), "field experiments" (pages 401-404) and "field studies" (pages 405-408).

The "clinical or case studies" constitute the fifth main category of educational research. According to Adelman et al. (1977: 139-150), Nisbet and Watt (1978) and Nisbet and Entwistle (1970: 15, 135-143), in these investigations, small groups of, or individual, subjects are observed systematically, using such methods as video-tape recording techniques and time sampling and observation schedules, and are tested in great detail, often as a preliminary to carrying out larger-scale studies. Some of the problems that a researcher must take into account when employing these approaches to educational research include the

effects of the presence of an observer upon the subject's performance, and the problem of classifying observations in such a manner as to provide a basis for comparison and analysis of the obtained data. These difficulties are, however, not insurmountable; the same authors suggest several methods of overcoming them (for example, see Nisbet and Entwistle, op. cit., 136-138).

The sixth type is what Borg and Gall (1979: 30-31, 444-473) called "causal-comparative research", which is often used when one wants to examine the possible effects of variables that cannot, for some ethical reasons, be manipulated experimentally with human subjects. In such studies, for example, an investigator who wants to examine the effects of brain-damage upon the academic performance of a group of subjects would start off by searching hospital records for adult males who had been involved in accidents that resulted in the destruction of brain tissue in the region under study. The researcher would then obtain a comparable sample of adults who had not suffered brain damage. The comparability of these two samples could be established by such variables as high school achievement, or intelligence of achievement test scores obtained from the participating individuals before the accidents occurred. Given these two samples of young adults who were comparable before the accidents occurred to the brain-damaged group, the researcher could then administer some problem-solving measures to both groups to identify possible effects of the brain damage (op. cit.: 30-31). Nevertheless, causal-comparative research is only valuable in identifying possible causes since results of such studies clearly do not provide concrete evidence that one of the variables examined actually caused the other. Hence, the need to carry out both causal-comparative research and experimental research concurrently or successively to establish convincing evidence of a cause-and-effect relationship.

Another type of research, which is almost similar to causal-comparative research, is called "correlational research". This type of research relies heavily on the use of the "correlational coefficient" as a statistical tool for comparing measurements taken on two different variables to determine the degree of relationship between the same variables. According to Borg and Gall, op. cit.: 31-33, 444-473,

correlational research involves the selection of individuals who vary on the measures or variables that are being studied. All the subjects in the selected sample are measured on both variables under study, and then a correlation coefficient is computed between the scores obtained by all the subjects in the sample on the two variables. Thus, whereas causal-comparative studies typically look for differences, correlational investigations typically look for relationships. There are two sub-types of correlational research, namely, "prediction studies" and "relationship studies". In the first instance, "prediction studies" are concerned with measuring a variable that can be used to predict some future event. "Relationship studies", on the other hand, usually study the relationship between measures of different variables obtained at about the same time to provide a better understanding of the factors that make up such a complex characteristic as artistic ability, for which an examination of the relative influence of the factors of observational skills, visual acuity, small-muscle dexterity and creative imagination might be essential. Correlational research has the major advantage of enabling the researcher to discover a wide variety of different relationships in that investigation.

The seventh category of educational research is called "action research". Action research involves the application of the scientific method to classroom problems, and differs from other educational research mainly in the extent to which findings can be generalised beyond a local educational institution's situation (Borg and Gall, ibid.: 37-38). The emphasis in action research is normally not on obtaining generalisable scientific knowledge about educational problems, but on obtaining knowledge concerning a specific local problem. Thus, a typical example of such research can be of a teacher undertaking a small action research project in his/her own classroom. This type of research is advantageous to the teacher or investigator in the sense that it helps to provide him/her with some objective and systematic techniques of problem-solving that provide an alternative to appealing to a higher authority for help or relying on his/her own personal experience. However, its major drawback is that its findings cannot be generalised to other classrooms or situations with great confidence due to the limited number of cases involved, the general lack of experimental control and the absence of sampling techniques.

The eighth type of educational research is called "evaluation research". It involves the systematic collection of evidence on the worth of educational programmes, products and techniques, and its main purpose is to help educators make new policy decisions. The main kinds of evaluation research are needs assessment, evaluation of completed education programmes and the evaluation of new programmes during the development process. This last kind is referred to as "formative evaluation" and is often carried out while a product is being developed to collect evidence which can be used to modify the product so as to make it more effective. "Summative evaluation" is undertaken with finished products or programmes, often in comparison with other products or programmes, to determine the relative effectiveness of these competing products or programmes (Bloom et al., 1971: 61-85, 117-138; Borg and Gall, ibid.: 36-37, 598-622).

According to Kerlinger's (1973: 378-409) classification, there is another type of investigation called "ex posto facto research". This type is defined as the 'systematic empirical inquiry in which the scientist does not have direct control of the independent variables because their manifestations have already occurred or because they are inherently not manipulable; or in which inferences about relations among variables are made without direct intervention from concomitant variation of independent and dependent variables' (page 379). Ex posto facto research differs from experimental research because ex posto facto research does not permit direct control of the variables involved; the researcher can use neither experimental manipulation nor random assignment. Thus, the "truth" of the hypothesised relation between variables x and y cannot be asserted with the confidence of the experimental environment. The main advantage of ex posto facto research is that it can be used in such fields as psychology, sociology and education in which some research problems do not lend themselves easily to experimental inquiry because they are not manipulable, for example, intelligence, aptitude, home background, parental upbringing, teacher personality and school atmosphere. Nevertheless, it has three main shortcomings, namely, the inability to allow for the manipulation of independent variables, the lack of power to randomise and the risk of improper interpretation of the findings.

Finally, it is necessary to distinguish between "longitudinal" or "long-term" and "cross-sectional" types of research. According to Evans (1978: 27), "cross-sectional" investigations involve the study of an individual or a group of subjects at a particular moment in time, or at two points which are widely separated, for example, the beginning and end of an academic year or term. The results of such studies involve descriptions of what the subjects are like at a particular moment or estimates of some of the changes which may have occurred in them between the two points in time at which they were tested. In the opinion of Borg and Gall (1979: 291), data generated from such studies tend to be distorted by the faulty recollection of the respondents. Nevertheless, most of the small-scale investigations tend to fall in the "cross-sectional" category of research.

At the other end of the continuum can be found the category of "longitudinal" or "long-term" studies, which Borg and Gall (1979: 290-292) classified under the general category of survey research. In longitudinal studies, an individual or a group of subjects is observed over a period of, or at different points in, time to collect and record data for studying developmental changes or for exploring time-ordered associations. Borg and Gall (1979) identified three main sub-types of longitudinal designs, which differ in terms of the respondents, who are studied at different points in time. Firstly, "trend studies" involve the random sampling at each data collection point of a given general population and the surveying, through questionnaires or interviews, of the representative sample from year to year. On the basis of the data collected, the researcher can compare the responses from year to year so as to determine what trends emerged throughout the period of the research. In the second sub-type of "cohort studies" and in contrast with trend studies which use constantly changing subjects within a general population, a specific population is observed over a period of time. For example, it may be possible to study the professional progress of a specific population (post-graduate certificate of education student teachers, 1980/81) by randomly selecting from each data collection point a sample from a general list of all the student teachers on the 1980/81 course. Thus, while the population would remain the same, different individual subjects would be sampled each year to

determine professional progress. Thirdly, through "panel studies" a researcher is enabled to select a sample at the beginning of a study and to observe their developmental changes over time by surveying that sample at each subsequent data collection point. Unlike trend and cohort studies, panel studies have the advantage of ensuring that the investigator notes changes in specific individuals and explores possible reasons to explain the observed changes since those subjects constitute the research sample at each data collection point. The only problem with panel studies is the possible loss of subjects, especially if the research takes a long period of time. This loss does not only reduce the number of subjects but it may also leave the investigator with a biased sample in terms of the differences in the attitude of those subjects who drop out and those who remain.

While longitudinal studies may be superior to the collection of time-ordered data in a cross-sectional investigation because the data thus collected are not distorted by the faulty recollection of the respondents, they have some limitations. Firstly, longitudinal studies cannot be carried out within a short period of time since changes occurring over a short time may be too small to be observed. Secondly, if these studies have to be undertaken in a school or area, there are several organisational problems of which the investigator has to take account. For example, changes in the school teachers and pupils; introduction of new methods of teaching and organisation; and changes in the catchment area of a school may result in an influx of different types of pupils or the removal of large numbers of pupils and families from the area. The possible occurrence of any of these changes over a period of years may render the completion of the planned research difficult, if not impossible.

On the basis of this outline of the major types of educational research, their relative advantages and weaknesses, it is now possible to determine the nature or type of the present investigation. As noted earlier, this study sets out to investigate the development of territorial decentration in Kenyan African children mainly through a cross-cultural replication and extension of Stoltman's (1971, 1976) research instrument. Nevertheless, the study relies on other theoretical and experimental methods of collecting, processing and analysing research data.

Firstly, a substantial amount of background information has been obtained through a critical survey of major published and unpublished works of literature, all of which appear in the bibliography. These works include textbooks, research articles in journals and other scholarly magazines, official government development plans, departmental and parastatal organisation's annual and commission reports, UNESCO's publications and reports, research degree dissertations and theses, the prospectuses of educational institutions, syllabuses and/or course programmes and university departmental and conference papers and reports.

Secondly, through interviewing and the administration of a series of research tests and related tasks to the subjects in the sample in experimental situations over a short period of not more than six months, it has been possible to collect a wide range of empirical data on a number of research variables under study. This data, processed and analysed statistically, will be used in the process of testing a number of hypotheses to determine the relative significance of a number of independent variables in influencing the development of territorial decentration amongst Kenyan African children. In addition, by using some short questionnaires incorporated within the subjects' test-response booklets or sheets, it has been possible to obtain some background information about, and directly from, the subjects themselves. The information obtained makes possible a cross-check with that contained in the official records. For this reason, this author administered the "questionnaire" to each subject immediately before the main interview and test began. In cases where there were anomalies, the investigator corrected the facts with the help of the subject concerned and then allowed the subject to take part in the experiment.

Thirdly, this writer's personal consultation with some of the earlier researchers and authors through direct conversation and/or correspondence helped to generate more information and to clarify their points of view and critical comments about issues relevant to the problem under investigation in this study.

In view of the foregoing three aspects, and in a nutshell, this study is not only cross-cultural and replicational in nature, but it can

also claim to possess characteristics that are, to some extent, typical of the cross-sectional, the survey or descriptive, the experimental, the observational, the clinical or case study, and/or the correlational categories of educational research.

II.7 The Major Limitations to the Scope of the Present Study and Some Suggestions for Overcoming the Constraints

As stated above, this investigation's general purpose is to study the development of territorial decentration in Kenyan African children through an examination of Piaget's spatial stages in relation to the school geography curriculum in Kenya. As will be discussed below in greater detail, a total of 270 students was selected from three different physical-eco-cultural environmental regions of Kenya to constitute the present research sample. Furthermore, an attempt will be made to determine the relative significance of a number of factors in influencing the subjects' development of territorial decentration by statistically testing a number of hypotheses. The subjects were required to perform some operational tasks in experimental but untimed conditions in order to reveal their (subjects') competence and performance as objectively as possible.

Ideally, this investigation should have satisfied the following conditions. Firstly, to ensure that the study should generate most comprehensive and comparatively meaningful results which could be generalised with greater confidence, a research sample larger than that of 270 subjects would have been more appropriate. Secondly, this larger sample would have been selected from a much wider range of physical and eco-cultural environmental regions than the present three named earlier. For instance, a study of subjects from such areas as the inland Lake Victoria basin and the Indian Ocean coastal belt of Kenya would probably have helped to determine whether or not there are any differences in the stages and rates of the development of territorial decentration between these subjects, who have experiences of different environments, and those who have actually been included in this study. Thirdly, it would have been preferred to include in this research sample subjects aged from 6 to 20 years, instead of the present age range of 11

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to 20 years, to ensure a more effective and comprehensive basis for the comparative testing of the universality and generalisability of Piaget's spatial stages theory and some of the major findings of other investigators in this field of research. Finally, the innovatory element of this study would have been improved and strengthened if an attempt had been made to develop an entirely new criterion instrument either to replace Stoltman's (1971, 1976) Territorial Decentration Test, or to use both of them concurrently.

While several factors and constraints operated jointly to limit the innovative nature and scope of this investigation, several ways and means of overcoming some of these limitations suggested themselves for use by this writer to strengthen the authenticity and effectiveness of the scope, possible findings and recommendations of the study, as outlined below.

The first major constraint was the time factor. The restricted period of about three years, within which this entire research had to be planned, developed and completed, could hardly allow this investigator the opportunity to undertake field research throughout all the regions of Kenya. Thus, although he had originally proposed to draw his research sample from at least 5 different ecological regions of the country, he was forced to restrict the sample catchment to a manageable number of 3 regions, which were described briefly earlier in this chapter. This time factor also operated to restrict the extent to which the investigator could observe the behaviour of each of the subjects in the research sample as closely as would have been otherwise possible. Furthermore, any attempt to make the size of the research sample larger than the present total of 270 subjects would have necessitated a corresponding increase in the amount of time, which was unfortunately not possible.

Secondly, and closely related to the time factor, financial limitations exerted their respective influence in restricting the scope of this study. Given the experimental nature of, and the characteristics of the sample used in, this research, it was imperative for this study's fieldwork to be carried out in Kenya, East Africa. This condition meant that a substantial amount of money, which was not easy to find, had

to be spent on covering air-transport costs for the journey between Southampton and Nairobi for both the researcher and the research materials. Moreover, the investigator had to look for additional funds to enable him to develop all the research materials and to travel the long distances to the 7 research schools located in the three different provinces of Kenya. The author also needed to spend substantial funds to purchase most of the essential textbooks and materials, which could not be readily obtained locally. Given these financial commitments, it would not have been feasible to draw the research sample from a greater number of ecological regions than the present three, or even to increase the size of the sample, since all these attempts would have meant expenditure of greater funds than were available.

The third constraint was the problem of accessibility to the primary and secondary sources of information in relation to the original research and subsequent related studies. As noted above, while the original research on the development of the notions of territorial relationships was based at the Section of Psychology, Faculty of Psychology and Educational Sciences, University of Geneva, Switzerland, and was conducted mainly in French, subsequent studies were carried out in Scotland, some Western European countries, the U.S.A. and Brazil. Thus, the author had to deal with the problem of gaining access to these sources of information in order to plan and carry out a viable and substantial piece of research effectively.

The following inter-related methods were used to solve the problem described above. Firstly, most of the literary publications (for example, journal articles, unpublished monographs, dissertations, theses, microfilms, microfiches, research reports and textbooks) were called for and obtained through the auspices of both the British Universities Inter-Library Loan Service and the Southampton University Libraries Service. Secondly, the Xerox Corporation's Dissertation Abstracts International Retrospective Index (1970) - Volume VII, Part 2: Education, and the University Microfilms International's monthly Dissertation Abstracts International: A - The Humanities and Social Sciences, which are held in the Reference Section of the Southampton University Library, also formed an invaluable source of information, particularly during the formative stages of this research. Another strategy adopted

was to write directly to the original researchers, authors of journal articles and/or publishers to ask them for reprints of the relevant items required. Fourthly, some useful information was obtained through this writer's personal correspondence with some of the earlier researchers.[14] The fifth and perhaps the most effective method of gaining access to material was that of undertaking a personal visit to such a research institution as the Section of Psychology, Faculty of Psychological and Educational Sciences at the University of Geneva, and of actually holding consultational conversations with some of the researchers there (for example, P.R. Dasen and the late Jean Piaget) who have worked on problems that are similar to the one under present investigation. Such personal contacts with these experienced researchers helped this author to clarify several points relating to this study, and to gain useful insights into the current status of, and trends in, the research on the development of territorial decentration. It is noteworthy that Borg and Gall (1979: 132-133) suggested methods of dealing with the problem of accessibility to sources of information which are similar to those discussed above. Finally, and as was noted earlier, this writer purchased most of the essential textbooks, particularly those from the U.S.A., which could not be easily obtained locally either from the Southampton University Library or through the British Universities Inter-Library Loan Service.

The fourth constraint related to the problems of linguistic communication, especially in the lower primary school grades, and to some subcultural differences between the investigator and his research subjects. These problems were solved as follows. Firstly, as an indigenous East African citizen, the investigator belongs to the African cultural group, or to what Dasen (1977c: 14) and Kamara and Easley (1977: 33-39) have called the "group of native-born and non-expatriate investigators", who, having received their education in institutions in East Africa and other countries in the West, are currently carrying out research in their local environments. Secondly, he has a working knowledge both of English, the Kenyan official language and post-primary Standard 4 medium of formal educational instruction, and of Kiswahili, the national language which is expected to be widely used throughout the country by every citizen. In addition, he has not only lived and worked in

both the urban and rural environments of the country, but has also undertaken geographical fieldwork excursions throughout much of Kenya. These factors operated positively to keep the influence of the problem of "communication noise" to the absolute minimum and to reduce or eliminate the "cultural distance" between the researcher and his subjects.[15]

Despite these positive factors, it was considered inappropriate to select the research subjects below the level of primary Standard 6. This was so because below this standard and as explained above, the majority of children do not seem to have developed a sufficiently high level of functional knowledge of English and Kiswahili, both of which are actually second languages to most of these children. Moreover, in some rural schools, it is common to find that tribal languages are the main media of instruction up to Standard 3. Thus, although it would have been instructive, in terms of Piagetian psychological research, to include younger subjects in this study, this was not possible due to the need of avoiding any possible linguistic misunderstandings. Therefore, the youngest subjects are in Standard 6, the lowest level from which subjects could be drawn, and are aged 11 years. For similar reasons, though it would probably have been instructive, it was not possible to involve non-schooled subjects in this study's sample.

As anticipated, several organisational problems presented themselves. Firstly, the research schedule and school routine could have been disrupted tremendously if fieldwork for this study had been carried out either over a longer period, or in the period between November and December, in which are found several public and school gazzetted holidays, and during which most of the school public examinations currently take place. This problem was offset when it was decided, during the research planning phase, to undertake fieldwork between January and July, 1980. Secondly, by seeking maximum cooperation from authorities at the Office of the President, the National Council for Science and Technology, the Ministries of Basic and of Higher Education (then known jointly as the Ministry of Education), Kenyatta University College (especially the Bureau of Educational Research), the Kenya Institute of Education, the National Examinations Council and from provincial and district public and educational administrators, school head-teachers, teachers and pupils, all of whom were also helped,

within reasonable ethical limits, to appreciate the viability, importance and use of this research, the writer was able to overcome such subtle but important problems as negative and/or lukewarm attitude amongst some of the members of these organisations and groups towards the research and the investigator and pupil absenteeism during the fieldwork period.[16]

Finally, the nature and scope of this study have been further restricted by the theoretical and methodological features and requirements of the original Piagetian and subsequent related investigations which this cross-sectional study of the development of territorial decentration in Kenyan African children sets out to replicate and extend cross-culturally. Nevertheless, and as will be discussed in Chapters IV and V, while most of the previous theoretical and methodological guidelines were followed as closely as possible to provide some opportunities for comparing and contrasting the respective results, it was also possible to make some necessary modifications and to incorporate additional research variables and instruments in an attempt to make this research more ecologically and culturally relevant and to help ensure that the results obtained throw more light on the research problem under investigation.

II.8 Summary

This second chapter undertook the consideration of the historical and evolutionary perspectives of the concept of territorial decentration, with whose development in Kenyan African children this research is specifically concerned.

To avoid any possible misunderstandings and/or confusion, some of the key concepts and terms used in this study were defined in operational terms. The concepts and terms thus defined were: territory, decentration, territorial decentration, egocentricity and physico-eco-cultural environmental and residential experience.

Through an outline of the nature of the research problem, it became apparent that while the current attempts to modernise and localise the general content and scope of the geography and geographical education curricula in Kenya are welcome and noteworthy, and whereas several

cross-cultural psychological and other related studies have been carried out in various parts of Africa, including East Africa, no such specific attempt has been made thus far to investigate the problem of the development of territorial decentration with specific reference to the school geography curricula and the geographical education and training of student teachers in Kenya. Thus, the following two research questions were stated for investigation in this study:

1.a. By what processes and stages are Kenyan African children able to acquire the concept of the nation-state in its spatial aspects?

b. What are some of the factors which influence the processes and rates of the development of territorial decentration in Kenyan African children?

2. What are the main implications of the possible answers to the questions stated above for the planning, implementation, evaluation and renewal of the curricula in school geography and in the geographical education and training of student teachers in Kenya?

The current status of research on territorial decentration and related aspects was determined through a critical review of pertinent literature. To this end, the original studies carried out by Piaget and his associates in Switzerland in 1928 and 1951, and those undertaken subsequently by such other main investigators as Jahoda (1963, 1964), Marsh (1966), Stoltman (1971, 1976) and Oliviera (1976) were examined. As a result, the specific variables to be investigated in this study were identified and stated. Thus, while the dependent variable is the development of territorial decentration, which will be operationalised by the total score and the decentration stage attained by a subject on the Territorial Decentration Test, the independent variables will be age, grade, sex, level of spatial concept development, perceptual ability or differentiation, level of logical reasoning and the physico-ecologico-cultural environmental and residential experience.

This cross-sectional and cross-cultural study will attempt to fulfil the following five purposes:

1. To contribute towards attempts being made to acquire functional knowledge about the Kenyan African children's cognitive and logical development through an empirical investigation in the subject interface of Piagetian psychology, geography and geographical education in Kenya;

2. To provide a basis for understanding the processes through which, and rates at which, Kenyan children acquire and apply the concepts of space and territorial decentration to develop spatial notions of the concept of the nation-state of Kenya;

3. To contribute towards an understanding of the relative significance of some of the factors which influence the development of the concept of territorial decentration;

4. To attempt a comparison of the results of this study with the findings of similar earlier investigations to determine as far as is possible the universality and generalisability of the theories and tests developed and applied in those studies; and,finally,

5. To identify, state and discuss some of the implications of the major results of this research for the processes of the planning, implementation, evaluation and renewal of the curricula in school geography and in the geographical education and training of student teachers in Kenya.

A survey of the main types of educational research revealed that this study is not only cross-cultural and replicational in nature but that it also possesses characteristics that are, to some extent, typical of the cross-sectional, survey or descriptive, experimental, observational, clinical or case-study, and/or correlational categories of educational research. Finally, while the major limitations to the scope of this research were outlined, several ways and means of overcoming these constraints were suggested and discussed. On the basis of these considerations, it will therefore be possible to state and describe the specific hypotheses of this investigation in the next chapter.

II.9 Notes and References

1. A similar view is apparently held by Walford (1973) who, while describing the purpose and scope of an instructional unit he devised to reveal the different perceptions of a local environment, contended that:

> Since the idea of place is central to geography, the fact that people mean many different things when they refer to a particular place (or territory) is an important concept to establish at some stage in a pupil's understanding of geography .... (page 29).

2. In addition to Miller (1970), other authors also seem to be agreed on this important aim of geography, as some of the following statements help to show:

   a. Berry, B.J.L. (1968: 25), who contended that while the geographic point of view is spatial, the integrating concepts and processes of the geographer relate to spatial integration, interactions, organisation and processes;

   b. Hudman (December, 1972: 520), who maintained that 'geographers are concerned with concepts of the spatial organisation of phenomena and their interrelations, particularly to man'; and

   c. Kohn (1966: 356), who argued that the modern purpose of geography as a science is 'to discover and account for regularities in the areal distrition of natural and cultural phenomena, or the lawfulness in area differences from place to place over the earth's surface'.

3. This contention seems to be in consonance with an earlier observation made by an American anthropologist (Bascom, 1962) who, while viewing tribalism as an obstacle to national unity, was also quick to caution that growing nationalism could become a future obstacle to broader African identification or Pan-Africanism.

4. As he acknowledged, Piaget (1928: 113) undertook this particular investigation in collaboration with Mlle. Lisa Hahnloser.

Jahoda (1963, 1964) used such letters and numbers as "W6" and "M7" to describe the various subjects in his research sample in socio-economic terms. Thus, in this example, whereas subject "W6" came from a working-class district and/or socio-economic parentage, and was aged 6 years, subject "M7" came from a middle-class district and/or socio-economic parentage and was aged 7 years. Where necessary, the subject's sex was specified.

6. These materials or props and the possible types of failure and success manipulative responses in the "space test" are respectively presented diagrammatically in Figures 1 and 2 in Jahoda's (1963-I: 52 and 54) report.

7. For a map showing the locations of schools used in this study, one can refer to Marsh's (1966: 19) dissertation.

8. These props are illustrated diagrammatically in Figure II, which shows the 'materials used in the Space Test ($X\frac{1}{2}$)' in Marsh's (1966: 26) report.

9. See Marsh's (1966: 33) diagram of some typical arrangements of the Space Test props.

10. Defining the term "cross-cultural study", and explaining the use of this approach in child and developmental psychology, LeVine (1970) maintained that

> ... cross-cultural study in child psychology, as in developmental psychology generally, and given ethical restraint on experimental intervention by the investigator, is a research strategy for using measurable variations among human populations (in behaviour patterns, environmental conditions, gene frequencies) to search systematically for the causes of individual behaviour and development ..... It serves child psychology by expanding the range of observable variation, by discovering the limits of this range for the human species, by identifying extreme or unusual populations in which experimental or quasi-experimental studies (for example, longitudinal studies) would shed especially crucial light on aetiological (that is, causal) issues... (page 559).

According to Berry (1976: 4), 'cross-cultural psychology is the study of aspects of individual human behaviour as it

develops and is displayed in a wide variety of ecological and cultural settings'. (It should be noted that the term "ecological" is used here in the general sense which covers the physical and biotic elements of a particular environment).

11. Details of this Territorial Decentration Test and other research instruments will be discussed in Chapter V.

12. According to Oliviera (1976: 23), an integrated public school in Sao Paulo, Brazil is one in which the technical, academic, administrative, and financial aspects of the elementary and junior high school are totally merged into one unit which functions in one building under the direction of one principal. The enrolment of Professor Marciano Toledo Piza School in 1976 was 895 (433 girls and 462 boys).

13. Personal communication with Professor Joseph P. Stoltman in May 1979.

14. These earlier researchers and other research organisations with whom such personal communication was made through correspondence include Pierre R. Dasen and the late Jean Piaget of the University of Geneva, Switzerland; Professor Pieter J.D. Drenth, Free University, Amsterdam, the Netherlands; Professor Barnabas Otaala, then at Kenyatta University College, Nairobi, and currently at the University College of Botswana, Southern Africa; Professor Joseph P. Stoltman, Chairperson, Department of Geography, Western Michigan University, U.S.A.; The Administrative Assistant, Psychological Development Research Division, Educational Testing Service, Princeton, New Jersey, U.S.A. and The Test Manager, NFER Publishing Company Limited, Windsor, Berkshire, England.

15. Despite these attempts, this writer is aware of Dasen's (1977c: 14) cautionary message to the effect that while a "native" researcher can do a truly "emic" study, the mere fact that he is part of the culture by birth is not a sufficient condition; he will still need a great amount of decentration to carry

out such a study objectively. Furthermore, while some general "culture-free" psychological tests have been produced for possible use cross-culturally, this investigator will make an attempt to make the necessary modifications to the research instruments adopted for use in this study to ensure that they are as "culture-fair" and as culturally relevant to the Kenyan situation as possible, as will be discussed in greater detail in Chapter V.

16. See copies of the correspondence between some of these authorities and the present writer in Appendix II.5, pages 443 to454.

CHAPTER III

STATEMENTS OF RATIONALE OF THE RESEARCH AND OF THE RESEARCH HYPOTHESES

III.0 Introduction

The preceding two chapters were concerned with a descriptive outline and critical overview of Piaget's theory of the global stages of the development of the structures of human thought and intelligence, and a consideration of the historical and evolutionary perspectives of the concept of territorial decentration. All these aspects were discussed through a critical review of pertinent literature, and an outline and statement of the research questions, problem and purposes. These considerations formed the basis for describing the rationale of this research, and for stating the specific hypotheses which will be tested later in this study.

As stated in Chapter II.5.1, one of the general aims of this study is to make a contribution towards the acquisition of functional knowledge about the Kenyan African children's cognitive and logical development through empirical research. In addition, one of its most important specific objectives is to examine the processes through, and rates at, which these children acquire and apply the concept of territorial decentration, which seems to be crucial to the development of the spatial notions of the concept of such a nation-state as Kenya (see Chapter II.5.2, page 101). It was also observed in Chapter II.4 that a number of related studies have been carried out in different countries (Jahoda; 1963, 1964; Marsh, 1966; Carnie: 1966, 1972; Jaspars et al., 1965; Stoltman: 1971, 1976; Oliviera, 1976; and Omari, 1977) to determine, inter alia, whether the development of territorial decentration amongst subjects in the countries investigated follows the invariant and sequential spatial stages, which were postulated by Piaget (1928) and Piaget and Weil (1951) in their samples of Swiss children, and whether the rates at which those stages are attained are also similar.

In line with, and on the basis of the findings of, previous related studies, particularly that of Stoltman (1971, 1976) which will be replicated and extended "cross-culturally", the present research will also

attempt, amongst other things, a comparative examination of the qualitative aspects of the development of territorial decentration in a sample of Kenyan African children. To this end, and following Stoltman's (1971, 1976) method[1], the first general hypothesis is designed to test the applicability of Piaget's theory of spatial stages, including the rates at which the stages are attained, to the development of territorial decentration in the Kenyan sample of African children. This comparative approach will help to provide a basis for determining the degree of the universality of Piaget's theory of spatial stages and the generalisability of some of the findings of the experimental tasks applied in the previous studies. The pursuit of this aspect will also facilitate the fulfilment of the present study's fourth specific objective, as stated in Chapter II.5.4, page 101.

In addition to the comparative examination of the qualitative aspects of the development of territorial decentration, and to achieve the third purpose which was stated in Chapter II.5.3, page 101, this study will examine the extent to which a number of selected factors operate, individually or interdependently, to influence the stages and rates of the development of territorial decentration. These independent variables are:

a. age;
b. sex differences;
c. grade, or year or level of schooling;
d. the socio-economic status of parents (SESP);
e. the physico-eco-cultural environmental and residential experience (PEERE);
f. the level of space concept development or the effectiveness of spatial judgment (LSCD or EOSJ);
g. the field-dependent and field-independent dimension of the cognitive styles of psychological differentiation (FD-FID); and
h. operational logical class inclusion ability.

Thus, a number of a priori hypotheses will be set up and tested to determine the relative significance of these independent variables in explaining the possible variance in this study's dependent variable: the development of territorial decentration in Kenyan African children.

According to Kerlinger (1973: 202-203), a "null hypothesis", which is sometimes indicated by the symbol "H_o", is 'a statistical proposition which states, essentially, that there is no relation between the variables of the problem....., and a succinct way to express the testing of obtained data against chance expectation; it expresses the chance expectation'. For Siegel (1956: 7), a null hypothesis is one 'of no differences and is usually formulated for the express purpose of being rejected. If it is rejected, the alternative hypothesis (H_1), which is the operational statement of the investigator's research hypothesis, may be accepted. The research hypothesis is the prediction derived from the theory under test'[2]. In view of Kerlinger's (1973) observation about the relative quality of null hypotheses, and in line with Stoltman's (1971, 1976) approach, the hypotheses for this study will be stated in null form.

Just as in the previous related study (Stoltman, op. cit.), the level of significance (p) of less than or equal to 0.05 (which will be expressed as: $p \leq 0.05$) will be used in this investigation. According to Siegel (1956: 10), the significance level, which is the probability that a statistical test will yield a value under which the null hypothesis will be rejected when in fact it is true, indicates the probability of committing a Type I error (α). In this study, therefore, the hypothesis will be rejected in its null form if the probability of making a Type I error is reduced to 0.05 or less. A Type I error will occur when the null hypothesis is true or correct, but is in fact rejected by the investigator (DuBois, 1965; Siegel, 1956: 8-11; Stoltman, 1976b: 43; and Travers, 1978: 284).

III.1 Stages and Rates of the Development of Territorial Decentration

It was noted above that the first general hypothesis to be stated in this study will, as was the case in the earlier investigations by Stoltman (1971, 1976) and Oliviera (1976), test as far as possible the applicability of Piaget's spatial stages to the development of territorial decentration in a sample of Kenyan African children.

The critical review of Piaget's and his associates' original studies in Chapter II.4, pages 69-78, revealed, firstly, that these investigators

did not publish their interview schedules in a systematic manner. Secondly, although these researchers provided age equivalents for the stages, cautioning that age ranges tended to overlap one another according to their observations of the data on the Swiss samples, they did not publish the distribution of the children in their samples in the three spatial stages by age. To rectify this situation, and using Piaget's observational reports, Stoltman (1971) developed a "Model of the Hypothetical Distribution of Stage Development by Age" against which newly observed samples could be tested for significance of differences. This model, which attempts to incorporate Piaget's allusion to variance in ages and stages, and is illustrated in Table III.1, page 127, was described by Stoltman (1976b) in the following words:

> The distribution formalised (in concrete terms) an expected frequency in the three stages between 6 and 12 years of age. Also, three hypothetical age ranges were considered in search of a Goodness of Fit to the cell by cell distribution. The distribution allowed for a minimum of thirty percent (30%) variance from Piaget's theoretical cells for aggregation. As age was varied for fit, the thirty percent (30%) variance in the cells further adjusted to overlap in ages and stages which Piaget failed to identify precisely. The hypothetical age-stage fits assumed a linear relationship between the children's conception of territory and their ages (page 41).

The present investigator proposes to use the modified version of this model of the hypothetical distribution of Piaget's spatial stages by age to test the applicability of the criteria to the development of territorial decentration in the sample of Kenyan African children.

As noted earlier, the 204 subjects in Stoltman's (1971, 1976) study were aged between 6 and 12 years, an age range which is not very different from that of the subjects interviewed by Piaget and his associates in Switzerland. Thus, and as illustrated by the present writer in Table III.2, page 127, Stoltman (1971, 1976) devised three age-range groups to determine the age-stage fits in his model of hypothetical distribution.

On the other hand, and due to the restrictive factors outlined earlier in Chapter II.7, pages 111-116, the age range for the subjects in the present research sample was 11 to 20 years. As was explained in Chapter I.4, pages 11-26, Piaget's theory of the global stages of the

TABLE III.1

MODEL OF HYPOTHETICAL DISTRIBUTION OF PIAGET'S SPATIAL STAGES

	Stages			
Age Group/Category	I	II	III	Total
1	70%	20%	10%	100%
2	20%	60%	20%	100%
3	10%	20%	70%	100%
Total	100%	100%	100%	

After Stoltman (1971, 1976).

TABLE III.2

AGE GROUPS AND AGE RANGES USED FOR EACH HYPOTHETICAL AGE-STAGE FIT BY STOLTMAN (1971)

Age Group/Category	Age-Stage Fit A	Age-Stage Fit B	Age-Stage Fit C
1	6.0 - 7.6*	6.0 - 7.11	6.0 - 8.6
2	7.7 - 9.6	8.0 - 9.11	8.7 - 10.6
3	9.7 - 12+	10.0 - 12+	10.7 - 12+

Source: Author

* 7.6 means: Seven years and six months of age.

development of the structures of human thought and intelligence postulated that a child normally attains the stages of concrete operational thought between 7 and 11 or 11.6 years of age, and that of propositional or formal operational thought between 11 or 11.6 and 15 years of age. Similarly, and as outlined in Chapter II.4, pages 69-78, Piaget (1928) postulated that the development of some notion of the "part to whole" relationship, with a tendency towards arranging these related elements in juxtaposition, begins between 7 or 8 and 10 and 11 years in Spatial Stage II. He further observed that it is not until the age of 10 or 11 years, and during Spatial Stage II, that the young adolescent is able to make the correct and logical territorial relationship (that is, viewing a town, village, district, province or state as part and parcel of the whole nation-state within whose boundaries they are all located).

From the survey of pertinent literature in Chapter II.4, it became apparent that most of the previous studies have tended to examine the stages and rate of the development of territorial decentration in their respective samples of children aged between 6 and 11 or 14 years (Stoltman, 1971 and Oliviera, 1976, for example). In terms of Piaget's theory of global stages of cognitive development, the efforts of those investigators were concentrated in the period varying from late pre-operational or pre-conceptual (6 or 7 years), through the concrete operational thought stage (7 to 11 or 11.6 years), and up to the beginning of the period of formal or propositional thought (or early adolescence: 11 or 11.6 to 14 years). This phenomenon seems to be similar to that observed earlier in Chapter I with regard to cross-cultural Piagetian research so far carried out mainly on the structures, stages and, to a lesser extent, processes, of concrete and formal operational thought and activities. It is essential to reiterate some of the remarks made earlier to justify this investigator's interest in examining the development of territorial decentration beyond the traditional "end-point" periods of 11 to 11.6 years (Piaget and associates: 1928, 1951), or 12 years (Stoltman, 1971, 1976), and/or 14 years (Oliviera, 1976), as outlined below.

Firstly, due to a number of factors discussed in Chapter II.7, it was, unfortunately, not possible to include 6 to 10.11-year-old subjects

in this study's research sample. Thus, the subjects' ages range from 11 to 20 years. While this might have the disadvantage of rendering it difficult for the present investigator to effect direct comparison of the findings of his study with those of the previous related ones, the results to be obtained will, however, as will be shown in Chapter VI, be useful in clarifying a number of other issues relating to the development of territorial decentration.

Secondly, as was pointed out in Chapter I, there is need to take note of Piaget's 1972: 6 and 10) remarks regarding his revised position with respect to the attainment of the fourth global stage of formal operations, even within "Western" culture. Piaget (1972) admitted that his first results on the global stage of formal operations had been 'based on a somewhat privileged population' (1972: 6). He also observed that while people are expected to attain the stage of formal operations if not between 11 and 15 years, at least between 15 and 20, '.... however, they reach this stage in different areas (environments) according to their aptitudes and their professional specialisations' (1972: 10). This view was emphasised by Dasen (1977c) who maintained that:

> What is lacking (and that is true of all Piagetian psychology, not only of the formal stage, and not only cross-cultural) are studies demonstrating the presence of operational thinking in culturally relevant, real-life situations. (page 7).

Thirdly, and again as noted in Chapter I.7, Dasen and Heron (1980: 45-49) discussed the problem of the apparent inability of some adults in a variety of culturally and socially differing environmental settings to demonstrate full concrete-operational competence in terms of acceptable performance on some Genevan tasks, a problem that is closely related to the second point discussed above. Dasen and Heron (op. cit.: 46) advanced two reasons to account for this lack of full adult concrete-operational competence, namely that:

> a. The Genevan tasks are inappropriate without varying methodological safeguards - such as practice and/or training; the use of clinical interviews and structural analysis rather than treating the task as standard performance tests; improved linguistic and cultural communication; and

b. The basic competence for a given concept or structure is not universally present in the form originally described by Piaget: its lack in a substantial proportion of adults reflects a culture-specific value system which is favouring the development of those concepts or structures which are needed in a given eco-cultural setting.

In view of the above, and given that several modifications will be made in the present study's main research instruments and methods to make them as culturally relevant as is practically possible, the present study may be expected to yield some results which will prove useful in determining whether Piaget's spatial stages and rates of attaining territorial decentration amongst a sample of Kenyan African children are comparable to those observed earlier by Piaget and his associates in Switzerland, and by other subsequent investigators in Western Europe, the U.S.A. and Brazil.

With specific reference to the problem of the stages and rates of the development of territorial decentration, and on the basis of the findings of most of the previous related studies, the present investigator predicts that the qualitative aspects (stages and rates of development) will be generally similar or identical in both the Kenyan sample of 11-to-20-year-old subjects and the much younger samples (6 to 11 or 12 or 14 years) of the earlier studies. In this case, it is expected to find that amongst the Kenyan African sample, the total number of subjects attaining the final Territorial Decentration Stage 3 (TDS.3) increases proportionately with increasing age. Thus, while the smallest number and/or percentage of Kenyan African children in the age group of 11.0 to 13.11 years is expected to be classified in TDS.3, and whereas a greater number and/or percentage will be found in the intermediate age group of 14.0 to 15.11 years, the greatest number and/or percentage of subjects who are totally territorially decentred is expected to be in the age group of 16.0 to 20 years. As will be explained later, the basis for classifying these subjects into the various territorial decentration stages will be their respective performance in this study's main criterion instrument, the Territorial Decentration Test (TDT).

Nevertheless, it was noted earlier that previous related studies, which used subjects relatively younger than those in the present study,

reported that TDS.3 was attained at the age of 10 or 11 years (Piaget and associates: 1928, 1951), or 12 years (Stoltman: 1971, 1976), or 14 years (Oliviera, 1976) respectively. In contrast to these findings, the present researcher predicts that, generally, the rates of the development of territorial decentration in the Kenyan sample will be relatively slower than that reported in the earlier related studies.

In view of the foregoing considerations regarding the problem of the stages and rates of the development of territorial decentration, and using a modified version of Stoltman's (1971) Model of Hypothetical Distribution of Piaget's Spatial Stages (Table III.3, page 132), in which the hypothetical age-stage fits A, B, and C assume a linear relationship between the subjects' development of territorial decentration and their ages, the following general hypothesis will be tested to determine the applicability of Piaget's spatial stages to the development of territorial decentration in a sample of Kenyan African children:

Hypothesis 1:

> It is hypothesised that the respective use of Age-Stage Fits: A, B and C will reveal that there is no significant difference between Piaget's (1928, 1951) Spatial Stages and the stages and rates of the development of territorial decentration in a sample of Kenyan African children

III.2 The Relative Influence of Age in the Development of Territorial Decentration

Evidence from some of the earlier studies, including Eshiwani's (1980), seems to suggest that age is one of the variables that is important in explaining cause-effect relationships within any given investigation. For example, and as already shown, Piaget (1928/1976: 113-134) and Piaget and Weil (1951) concluded that the child's ability to create a schema with the correct territorial relationships improves in sequence with increasing age. Elsewhere, Almy (1967b: 37) argued that 'chronological age, or more precisely, mental age, is one of the factors that provides a rough index to the child's ability to comprehend a certain concept'. Furthermore, Rivoire (1961: 103), who studied the ontogenetic development of spatial concepts in children from 4 to 14 years of age, concluded from her findings that 'age is a significantly

TABLE III.3

A MODIFIED MODEL OF THE HYPOTHETICAL DISTRIBUTION OF PIAGET'S SPATIAL STAGES BY AGE IN PERCENTAGES

Age Group or Category	Age Range in Years and Months	I	II	III	Row Total
	AGE-STAGE FIT A				
1.	11.0 - 12.11	70	20	10	100
2.	13.0 - 15.11	20	60	20	100
3.	16.0 - 20	10	20	70	100
	Column Totals	100	100	100	
	AGE-STAGE FIT B				
1.	11.0 - 13.11	70	20	10	100
2.	14.0 - 15.11	20	60	20	100
3.	16.0 - 20	10	20	70	100
	Column Totals	100	100	100	
	AGE-STAGE FIT C				
1.	11.0 - 14.11	70	20	10	100
2.	15.0 - 17.11	20	60	20	100
3.	18.0 - 20	10	20	70	100
	Column Totals	100	100	100	

After Stoltman (1971, 1976).

contributing factor in the development of the concept of space'. Yet, and in contrast to the examples cited above, some other studies do not seem to find age such an influential variable. For instance, Jaspars et al. (1965: 48), who investigated the development of international attitudes amongst Dutch children in the Leiden sample, reported that the correlation they found between these children's preference for other persons and their judgment of those peoples' nationality, as measured by using a series of photographs, did not change significantly with age.

Of particular relevance to the present research are several studies which not only generally concerned themselves with testing the degree of the universality and applicability of the theory of spatial stages as postulated by Piaget and his associates (1928, 1951), but also specifically investigated the relationship between age and the development of territorial decentration, as shown below.

In conformity with Piaget's and his associates' (1928, 1951) reported finding, and reporting the difficulty for younger children in his sample to display a clear understanding of the concepts of town and country, Jahoda (1963: 58) also observed that the concept of "Scotland" gained increasing prominence with increasing age. As already noted, and much as it would have been instructive to examine the relative influence of this variable in the performance of her rural and urban sample of Scottish children, Marsh (1966: 18) could not report on this aspect since she kept the age of her subjects constant by selecting only 9-year-old children.

Having found a positive correlation of .536 ($p < .01$), Stoltman (1971: 41 and 1976b: 48) concluded that age was significantly related to territorial concept development amongst his sample of American children. Finally, Stoltman (1976: 27) and Oliviera (1976), who performed stepwise regression analyses to explore further the effects of various factors on the development of territorial decentration, reported that, of the three independent variables, age was the most significant in explaining the scores on the TDT, followed respectively by the socio-economic status of the parents and sex differences of the subjects.

Thus, it is hoped that the results of the present study should produce some further evidence which will help to confirm, or refute, the findings of some of the earlier studies, and also assist in determining the extent to which the Kenyan African children's development of territorial decentration is a function of age. It is further predicted that, should a positive correlation occur between the criteria under discussion, a larger number or percentage of older subjects (16 years and above) will generally be more territorially decentred than the younger ones in the sample. Put differently, while the number or percentage of subjects attaining TDS.3 will rise as the age increases, the number or percentage of subjects in the Kenyan sample failing to reach the same operational level will fall with increasing age. Hence, the following hypothesis:

Hypothesis 2:

> It is hypothesised that there is no significant relationship between age and the development of territorial decentration in Kenyan African children.

III.3 The Relationship between Sex Differences and the Development of Territorial Decentration

Reports from some earlier investigations seem to be at variance with regard to the competence and performance of female and male subjects in any one given research task. On the one hand, for example, La Crosse (1965: 90) concluded her study of the relationship between Piagetian stages of spatial concept development and the Rod-and-Frame Test (RFT) performance by underlining the future importance of examining the relative significance of the sex difference and race variables in influencing pre-trained RFT performance. On the other hand, Marsh (1966: 17) decided neither to match her sample for sex nor to test for the significance of sex differences in the formation of the concepts of town and country.

A review of literature undertaken by the present writer showed that there were a number of studies which revealed no significant sex differences in performance. For instance, Rivoire (1961: 98) reported that no significant differences were found between boys and girls. She thus concluded that amongst the subjects in her study, sex differences were not influential in the development of the concept of space. Jahoda (1963: 48) was able to observe that while sex was one of the variables

which had to be controlled in his study, in general, no significant sex differences emerged though there was some evidence to suggest that boys tended to outperform girls on the territorial tasks. Jaspars et al. (1965: 48) reported that though a correlation was found between the Dutch children's preference for other persons and their judgment of those peoples' nationality, as measured by a series of photographs, this correlation did not reveal any significant differences between boys and girls. Stoltman (1971: 42; 1976b: 47-48), who specifically sought to test for the main effects of the difference between the sexes on the development of the concept of territory, reported that no significant difference was found between boys and girls. Similarly, and as reported in Stoltman (1976b: 27-28), Oliviera (1976) did not find such significant differences between the sexes.

Other studies, however, have tended to reveal the existence of sex differences in the competence and performance of their respective subjects. For example, Lord (1941: 503-504), who investigated the notion of cardinal directions in elementary school children, discovered that girls, as a group, were generally found to be inferior to boys in space orientation. Almy (1967b: 39) observed that some evidence from such studies as that conducted by Anastasi and Foley (1949, 1958) indicated that girls are somewhat slower than boys in dealing with spatial or territorial relationships and that girls tend to need more direct experience in instructional situations. Mwaniki (1973: 102-103 and 110) reported that differences between the sexes were found to exist in self-concept measures of school subjects and social relations with the same sex. Thus, while the boys in her sample seemed to consider and take their school work much more seriously than the girls, the latter tended to take social relations more seriously, and to reveal a greater tendency of keeping together, than the boys. She attributed the occurrence of these differences to the various specific roles assigned to each sex type, the different methods of upbringing of boys and girls, and the kind of pressure boys and girls receive from their parents. Otaala (1973: 69-71) examined, in terms of sex differences, the results of the Ugandan Iteso[3] children who performed operationally in each of the tasks presented in his study of the development of operational thinking. He reported that though boys in P1, P5 and P7[4] tended to outperform the girls, and that while this performance seemed to even out in P3,

these sex differences could not, however, be interpreted as significant due to the unevenness of the numbers of boys and girls in the upper classes or grades and because the sample was neither very large nor random. In addition, Eshiwani (1974: 269) cautioned that one of the challenging problems in the teaching and/or learning of mathematics in Kenya's secondary schools 'is the greater antipathy to mathematics shown by girls and their more general failure in mathematical understanding ..... This sex difference in mathematical ability has been known for a long time and it is found to persist even when boys and girls are taught together in the same class by the same (male or female) teacher'[5].

According to Witkin (1978: 41), Witkin et al. (1977a: 7), Berry (1971, 1976), Satterly (1976, 1977) and Stewart (1973, 1974), evidence from studies based on the theories of the field-dependent and field-independent dimension (FD-FID) cognitive styles[6] of psychological differentiation suggests that in Western societies, women, on average, tend to be more field-dependent than men. However, the argument continues, observations from recent cross-cultural studies indicate that whereas sex differences in the FD-FI dimension may be uncommon in mobile, hunting societies, they are prevalent in sedentary, agricultural societies which are characteristically different in sex-role training and in the value attached to the women's role in the economy. In this latter case, these differences can be attributed to the important role of socialisation processes within the society.[7]

Furthermore, Arap-Maritim (1979: 164) studied the academic self-concept and the teacher's perception and their relationship to the pupil's grade attainment in rural Kenya, using a sample of Kipsigis children. He reported that on all the achievement variables studied (that is, the self-concept and the teacher's perception), the boys in the sample significantly out-achieved the girls. Eshiwani (1980: 6 and 11) reported differences that favour boys as opposed to girls in their performance on the time concepts test. Lastly, in a recent investigation into the perception of atlas maps in Botswana, Southern Africa, Renshaw (1979: 145-146) reported, inter alia, that while the Batswana school girls seemed to prefer generalities to specifics, and tended, to a degree, to skirt the real issue, a similarly-aged sample of Batswana boys showed themselves to be more proficient solvers of map reading problems and

better, or less imaginative, visualisers of the reality behind the maps.

As Otaala (1973: 69) and Mwaniki (1973: 110) maintained, and according to the present researcher's personal experience and observations, girls and boys in the East African traditional societal setting are assigned different domestic duties to perform by their parents and/or guardians. For example, the girls generally undertake such domestic duties as preparing food, helping their mothers to look after the younger members of the family, and doing some work in the family garden ("Shamba"). All these duties tend to limit the girls' experience of the real environment to that of the home and its immediate surroundings. The boys, on the other hand, and usually in the company of their fathers and/or guardians, generally perform such duties as herding and grazing any domestic animals the family may possess (for example, cattle, sheep and goats), fetching water from the local wells, undertaking errands to distant family relations and/or administrative authorities in town centres and taking part in occasional hunting exercises. Since most of these activities involve the coverage of long distances away from home, the boys are thereby apparently provided with better opportunities for experiencing the more extensive environment than the girls. It would, therefore, seem reasonable to assume that these differences in the experience of the environment help to enhance, or retard, the development of various conceptual, perceptual and experiential skills amongst boys and girls. Thus, and despite the fact that traditional societal values and practices are undergoing some dynamic transformation with increasing socio-economic development, it seems plausible to predict that, should some significant relationship between sex differences and the development of territorial decentration be discovered through testing the hypothesis stated below, the boys in the present research sample will tend, generally, to outperform similarly-aged girls in each of the same 3 regional sub-samples.

Hypothesis 3:

> It is hypothesised that there is no significant relationship between sex differences and the development of territorial decentration in Kenyan African children.

III.4 The Relative Influence of Grade or Year of Schooling in the Development of Territorial Decentration

An examination of the various Kenyan school syllabuses in geography, history, and social and/or environmental studies, which are either in current use or are awaiting implementation, revealed a general tendency towards the so-called "expanding environment or communities approach" which was discussed briefly in Chapter II. In the tradition of this expanding environment or communities curriculum, for example, and using the concentric model presented earlier (Chapter II, pages 56 to 58), study topics tend to be covered in sequence, beginning with the family and home levels and, running through the school, village/sub-location or neighbourhood, local communities (counties, districts and towns), provinces, metropolitan cities to the Kenya national community level, and all those territorial communities in relation to the international community of sister nation-states.

On studying these school syllabuses, the present writer discovered that the concepts to which the learners are introduced in the formal education system of schooling become systematically and progressively more complex as the level of schooling or grade becomes higher. Thus, and other factors being equal, this observation would imply that the students in such a higher grade as Form 3 not only have more concepts but also perform better in any given learning task than their counterparts in such lower grades as Form 1 and Standard 6. Using this premise, the present investigator considers it reasonable to predict that, should a significant relationship be found between the grade or level of schooling and the development of territorial decentration in the Kenyan sample of African children, the subjects in the higher grades will perform better in the TDT than their juniors. In other words, it is expected to find that the number of subjects in this research obtaining the highest scores, and thereby being classified in TDS.3, will be greatest in Form 3. This number will, however, tend to drop as the grade or level of schooling becomes lower so that the smallest number of subjects attaining TDS.3 is expected to be found in Standard 6.

It may be of interest to the reader to note that, despite the remarks made above, none of the earlier related studies attempted to investigate

specifically the relative influence of the factor of grade or level of schooling in the development of territorial decentration. The only researcher who got near to recognising its importance was Stoltman (1971, 1976b: 45), when he stratified his research population according to the grade level as controlled by the graded division incorporated within the school structure of Georgia, U.S.A. Nevertheless, he did not eventually test for the significance of the effect of this independent variable in the development of territorial decentration amongst his American subjects.

In view of the above observations, the following hypothesis will be tested:

Hypothesis 4:

> It is hypothesised that there is no significant relationship between the grade or level of schooling and the development of territorial decentration in Kenyan African children.

III.5 The Relative Effect of the Socio-Economic Status of the Parents (SESP) on the Development of Territorial Decentration

The role of the socio-economic status of the parents or the socio-economic background of the research subjects (SESP), as a factor in concept development has been studied by several earlier investigators (for example, de Lacey, 1970; Hollingshead, 1957; Jahoda: 1963, 1964; Lloyd, 1971; Mwaniki, 1973; Oliviera, 1976; and Stoltman: 1971, 1976).

With particular reference to the development of the children's ideas of country and nationality, concepts which are relevant to the problem under investigation in the present study, Jahoda (1963-I: 152) reported that, in general, the children from the middle class (M) schools in Glasgow were found to be significantly in advance of those from the working class (W) schools of the same city. He also noted, however, that when (M) and (W) children were matched for intelligence score, the reported difference disappeared. He thus concluded that the factor of intelligence accounted for a large part of individual variations and group differences.

Stoltman (1971, 1976b: 42 and 48) examined the relative significance of race and, by implication, SESP, arguing that in the U.S.A., black children (especially those in his North Georgian sample) are most frequently in the lower socio-economic group which is, correspondingly, socio-economically disadvantaged (page 42). As noted in Chapter II.4, pages 91- 92, Stoltman (1971, 1976) reported that while the significant difference found between the black and white subjects was probably attributable to the SESP rather than the effect of race, the discovery of a correlation of -0.484 ($p < 0.01$) between the SESP and the development of the territorial concept led to the rejection of his seventh hypothesis in its null form and to the conclusion that the two variables were significantly related.

As observed in Chapter II.4, pages 94 - 95 , Oliviera (1976) also examined the relative influence of the SESP in the development of territorial concepts in a sample of Brazilian children. However, since 66.52 per cent of the total sample of 224 children were drawn from the lower upper class, and although neither significant differences in the scores obtained by children of different socio-economic background nor a significant interaction of sex and SESP were observed, Oliviera could not easily interpret SESP as an influencing, or non-influencing, factor in the Brazilian subjects' performance on the TDT.

According to the Gachathi Report of the National Committee on Educational Objectives and Policies (NCEOP) (1976a: xii-xiv), the Kenyan education system was charged with the formidable task of facilitating the achievement of national unity. This objective is claimed to have been partly achieved through the abolition of racial segregation from the school system, the localisation of syllabuses at all levels of education and the concurrent introduction of eight major measures[8] to enhance national unity in an otherwise plural society. This society was composed of races and tribes which, prior to Independence (1963), were apparently divided for the administrative convenience of the then colonial government. The first paragraph of Chapter I of the 1979-1983 Development Plan (I), the fourth in the post-Independence series, states that:

> 1.1. Since Independence in 1963, Kenya has made substantial progress towards the long-term objectives adopted by KANU, the Government, and the nation. These objectives have been clearly stated in the Constitution, the several KANU Manifestoes, numerous addresses by the late President, Mzee Jomo Kenyatta, and H.E. the President, Hon. Daniel arap T. Moi, the three preceding development plans, and Sessional Paper No. 10 of 1965, entitled: "African Socialism and Its Application to Planning in Kenya". They (the objectives) include: political equality; religious freedom; social justice; freedom from want, ignorance and disease; human dignity including freedom of conscience, equal opportunity for all citizens, and high and growing per capita income equitably distributed (1979a: 1).

At a later stage in the same chapter, it is recognised that despite some degree of improvement in income distribution, 'the degree of inequality in Kenya is still very high with respect to long-term government objectives and in comparison with many other countries throughout the world'. This observation led on to the statement that 'it is a major objective of the present (Fourth) Plan to reduce further the degree of inequality (the Fourth Kenya Development Plan, op. cit.: 5).

In her study of the relationship between self-concept and academic achievement in Kenyan pupils, and using the Pearson Correlation Analysis technique, Mwaniki (1973: 64-75) carried out intercorrelation analyses for each of the four primary schools she used in her investigation: two in the urban and two in the rural areas of Kenya, respectively. Amongst other objectives, she included the Social-Economic Scale, whose development she had based on a consideration of such factors as father's occupation, his previous work, land ownership (in hectares or acres), father's education and mother's education, 'to examine whether there is any positive relationship between SESP and school achievement, and SESP and measures of self-concept' (page 64). She was able to report that while, in general, the father's occupation in the two urban schools influences the pupil's school performance, such a relationship between academic achievement and the father's occupation does not appear in the data on the rural schools. She argued that the parents in the urban area are engaged in various jobs, in addition to farming in some cases, and that these jobs give the urban parents a better income than the rural parents, who mainly depend on subsistence farming (Mwaniki, 1973:

79). A negative correlation between school achievement on the one hand, and the mother's education and the number of children in the family on the other, was reported to have been discovered for all the four schools (page 68).

Given the above, it is considered worthwhile to examine the relative influence of SESP of the Kenyan subjects, or of their socio-economic background, in their development of territorial decentration. It is predicted that, should a significant relationship be discovered between SESP and the development of territorial decentration, the subjects from the higher non-manual SESP categories I to IV will tend to perform better than those in the lower semi-skilled and unskilled manual SESP categories V, VI and O ("Don't Knows").

For purposes of examining the relationship described above, all the subjects in this research will be classified into six SESP categories. To achieve this classification, a modified version of Figueroa's (1976: 160-162) model of the SES of the father's present occupation (mother's present, or father's last occupation, where the father is deceased) will be employed.

To obtain the necessary background information which formed the basis for classifying the research subjects to the various SESP categories, the present writer, firstly, examined the school records and extracted all the necessary information about each subject. Secondly, he asked each subject to provide the required items of information by completing a short background questionnaire, which was attached to the main criterion instrument, the TDT. Finally, the researcher interviewed each subject individually about the information collected through these three ways. This three-pronged approach facilitated the process of ascertaining that the information obtained was as consistent and reliable as practically possible. The questions asked covered such aspects as the guardian's (father or mother or supporting relative) final level of formal education, present and previous main occupation, and, where possible, estimated monthly income. Despite the apparent unwillingness of some of the subjects to give agriculture or farming as one of their guardians' main occupations, the present writer encouraged them to name it where appropriate because, according to the Integrated Rural Survey (IRS) of

1976 (Republic of Kenya; 1876b), which is also cited in the Fourth Development Plan, 1979-1983 (I), ibid.: 230, 'if 2,000 hours of work per annum are assumed to imply full employment, then agriculture provides full employment for 3.24 million labourers, or 70 per cent of total labour availability in agriculture, if agricultural employment was spread evenly throughout the year'.

On the basis of the socio-economic criteria mentioned above, the subjects were assigned to the various SESP categories (see Table III.4, page 144). Appendix II.6, pages 455- 458, shows the detailed outline of some of the main examples of occupations classified in the six major SES categories. The following hypothesis will thus be tested:

Hypothesis 5:

> It is hypothesised that there is no significant relationship between the SESP of Kenyan children and their development of territorial decentration.

III.6 The Relationship between the Physico-Eco-Cultural Environmental and Residential Experience (PEERE) and the Development of Territorial Decentration

Generally, space in the rural and urban landscapes tends to be differently utilised by man. Correspondingly, the resultant types and patterns of spatial organisation and distribution of phenomena in these landscapes are also apparently different. Consequently, each of these environments tends not only to provide its inhabitants with various experiences but also requires the inhabitants to develop certain concepts which will enable them to operate competently, and to live with satisfaction, in their environments.

According to Berry's (1966b, 1971, 1976) model of "ecological-cultural functionalism", and to quote his own words:

> ..... persons who inhabit ecologies where hunting is the mode of sustenance should develop perceptual discrimination and spatial skills adapted to the ecological demands of hunting... Their cultures are expected to be supportive of the development of these skills through the presence of a high number of "geometrical spatial" concepts, a highly developed and generally shared arts and crafts production, and socialisation

Source: Author.

TABLE III.4*

NUMBERS AND PERCENTAGES OF ALL SUBJECTS IN EACH REGION[a] AND GRADE BY THE SOCIO-ECONOMIC STATUS (SES) OF FATHER'S PRESENT OCCUPATION (MOTHER'S OR GUARDIAN'S PRESENT, OR FATHER'S LAST, OCCUPATION WHERE THE FATHER WAS DECEASED)[b]

(N = 270)

	REGION 1					REGION 2					REGION 3						
Grade / SESP Category	6[c]	1	3	n[d]	%[e]	6	1	3	n	%	6	1	3	n	%	N	100%
I Non-Manual	-	7	6	13	4.81	-	-	2	2	0.74	-	1	-	1	0.37	16	5.92
II Non-Manual	1	9	9	19	7.04	2	1	-	3	1.11	-	-	1	1	0.37	23	8.52
III Non-Manual	2	9	4	15	5.55	1	1	1	3	1.11	-	2	-	2	0.74	20	7.41
IV Skilled Manual	20	4	10	34	12.59	9	9	3	21	7.78	1	3	7	11	4.07	66	24.44
V Semi-Skilled Manual	-	1	1	2	0.74	13	6	11	30	11.11	9	8	6	23	8.52	55	20.37
VI Unskilled Manual	3	-	-	3	1.11	5	13	13	31	11.48	20	16	16	52	19.26	86	31.85
Don't Know (D.K.)	4	-	-	4	1.48	-	-	-	-	-	-	-	-	-	-	04	1.48
Overall Total (n and N)	30	30	30	90	33.3	30	30	30	90	33.33	30	30	30	90	33.33	270	99.99 = 100%

Notes:

a. Region 1= The Metropolitan "highly carpentred", urban environment (Nairobi City, Nairobi Province).
Region 2= The Peri-urban/rural and dominantly high "parallel ridge and valley" forested landscape (Kiambu District, Central Province).
Region 3= The Remote Rural and dominantly-undulating "open grassland" landscape, or according to Segall et alii's (1966: 99-113) thesis, "the environment of extended vistas of the open savannas".

b. This table is a modified version of Figueroa's (1976: 160-162) Model to be found in Figueroa, P.M.E. and Persaud, G. (Eds.) (1976): Sociology of Education - A Caribbean Reader, Oxford University Press, Oxford.

* The data in the table were collected between January and July, 1980. For a detailed outline of some examples of the SESP categories, refer to Appendix II.6, pp. 455-458.

c. This refers to Primary School Standard Six.

d. These columns contain the regional sub-total of subjects as distributed in each SESP category.

e. These columns, which immediately follow those described in (d) above, show the regional percentages for each of the SESP categories.

Source: Author.

> practices whose content emphasises independence and self-reliance, and whose techniques are supportive and encouraging of separate development. Implicit in this argument is the expectation that as hunting diminishes in importance across samples ranked in terms of this ecology dimension, the discrimination and spatial skills will diminish, as will each of the three cultural aids. (Berry, 1971: 328-329)

This model was defined operationally by placing low food-accumulating, migratory, hunting and gathering, low population density groups at one end of the continuum, and high food-accumulating, sedentary, agricultural, high population density groups at the other extreme end of the scale. Berry (1975) identified socialisation practices, family structure and social relations as the socio-cultural characteristics which tend to vary fairly consistently with the ecological dimension discussed above. Berry's "eco-cultural functionalistic" hypothesis was supported through his comparative studies of:

a. the traditional societies in Africa and Canada, respectively, the Temne of Sierra Leone and the Eskimos of Baffin Island (1966b);
b. the intermediate or transitional societies in Australia and New Guinea, respectively, the Aborigines and the Melanesians (1971); and
c. the agricultural-industrial/rural-village and industrial/urban societies in Scotland, respectively, the Scots at Inverkeilor and Edinburgh (1967, 1971 and 1976).

Table III.5, page 146, presents a general overview of the relationship between the main elements of the ecological and traditional cultural components. The people who are presumed to be intermediate or in the transitional stages on the same dimension are also expected to have intermediate levels of the associated variables.

If Berry's model is extended to the problem under investigation in this study, it would seem reasonable to contend that the rates of the development of territorial decentration may be partly determined by physical, ecological, and cultural factors, or what has been termed in this study "the physico-eco-cultural environmental and residential experience" (PEERE).

TABLE III.5

A GENERAL OVERVIEW OF THE ELEMENTS IN THE ECOLOGY AND TRADITIONAL CULTURE COMPONENTS

Components and Elements	Clustering at Poles of Dimension <——————————>	
ECOLOGY		
Exploitive Pattern	Hunting and Gathering	Agriculture
Food Accumulation	Low	High
Settlement Pattern	Nomadic	Sedentary
Mean Size	Low	High
CULTURE		
Role Diversity	Low	High
Sociocultural Stratification	Low	High
Socialisation Emphases	Assertion	Compliance

Source: Berry (1976: 60)

Some geographical studies have investigated the utilisation of the rural and urban space (for example, Abler et al., 1971/1977 and others cited earlier in Chapter II). The effects of urbanisation on various aspects of concept development have also been studied (Tyler, 1966; Poole, 1968; Mahar and Udai, 1969; Munroe and Munroe, 1971; Downs and Stea, 1973). With specific reference to Kenya, Munroe and Munroe (1971), for example, advanced the hypothesis that 'extensive movement through the environment might lead to enhanced spatial ability', and they observed and tested Logoli male and female children of Western Kenya. As a result of their experiments, they discovered that, firstly, the Logoli male children were more skilful than the Logoli female children at certain tests requiring the capacity to perform a set of behaviours ordered sequentially in space. They argued that this finding could be attributed to 'an innate tendency toward greater investigativeness and aggressiveness which seem to lead most males to a higher level of environmental experience than that achieved by most females'. Secondly, it was found that children who were farther away from home on the average

than their age-matched counterparts were also more skilful at the spatial task of copying block patterns.

There are other studies whose results seem to be relevant to the present discussion. Firstly, Piaget (1921/1929: 256-349), and as Marsh (1966: 16) noted, argued that some differences might well exist between the performance of otherwise comparable children who are drawn from different environments. Secondly, while Witkin et al. (1954) contended that past experience is influential in perceiving the visual world, Rivoire (1961: 100) asserted that the spatial or territorial experiences of the child constitute a dynamic process which is both an action and an integrative process of the new data which the child receives from day to day. She maintained that these experiences helped to explain why some subjects in her study developed concepts at 4 or 6 years while other children did not formulate the same concepts until as late as 14 or 15 years of age. Almy's (1967b: 37) view was that 'the kinds of experiences a child has had and the ways these experiences contributed to his conceptual repertoire are equally important as age .... in the child's ability to comprehend a concept'. Lastly, Sigel and Cocking (1977) contended that:

> ..... there is ample evidence to show that the rate and quality of cognitive development vary according to the type of environment .... Piagetian theory holds that environmental interactions, in which the child has opportunities for spontaneous learning through discovery and invention, are necessary for cognitive structures to evolve and grow (cognitive growth) ..... The physical and social environments provide the child with the necessary settings for constructing a social and physical reality..... (page 224-225).

Some cross-cultural studies in Piagetian psychology seem to suggest that schooling and contact with modernity, or the so-called "developed Western industrial-urban cultures", are influential variables in accelerating the acquisition of logical structures subsumed in Piagetian tasks. For example, Dasen (1970: 308) found evidence to support his second hypothesis that the rate of operational development is faster in the high-contact group (Hermannsburg) than in the low-contact group (Areyonga) of Australian Aborigines. Elsewhere, Bohland (1970) reported that the children's attachment to the county, which is an important territorial orientation of family units in rural North Georgia, U.S.A., may generally affect their territorial concept development.

Yet, in contrast to these findings, Omari (1977), who did not draw his Tanzanian rural and urban sample from the extreme ends of the rural-urban continuum, reported a lack of the influence of environmental differences in the performance of his subjects. He argued that educational and cultural socialisation factors were common and strong enough to blur the effects of other environmental antecedents. Similarly, Kiminyo (1977: 87), who investigated the effects of schooling, urbanisation, and sex on the discovery of conservation of mass, weight and volume in Kamba children in Kenya, reported that his detailed analyses indicated no significant differences between urban and rural, schooling and non-schooling, male and female subjects in total scores on conservation tasks. Jahoda (1963, 1964) observed that urban Scottish children did not conform to Piaget's (1928, 1951) spatial stages theory. Likewise, as a result of the analysis of variance of the mean scores on the TDT, Stoltman (1971, 1976) discovered that whilst neither the urban nor rural children conformed to Piaget's theoretical distribution, no significant difference existed between the urban and rural children in his American sample.

As noted in Chapter II.2.3, the subjects interviewed in this investigation were selected, in equal numbers (90), from each of the three different physico-eco-cultural environments, as shown in Figures IV.2, IV.10, and IV.12, pages 220/221, 230 and 238/239, respectively. Region 1 is the built-up metropolitan urban landscape of Nairobi City and Province. Despite its geographical location in the transitional zone between Regions 2 and 3, which will be described below, and according to the "carpentred-world hypothesis" of Segall et al. (1966: 83-97), which was advanced to explain partly how ecological differences might relate to visual-inference differences, the urban environment in Region 1 is apparently so "closed" that it tends to restrict its residents' scope of environmental spatio-visual perception. For detailed geographical accounts of Nairobi and its environs, one can refer to, inter alia, Hake (1977), Hutton (1970) and Morgan (1967).

Region 2 is the peri-urban/semi-rural, high plateau, or the so-called "parallel ridge and valley" landscape, sub-humid, high population density, and normally forested environment. This region is inhabited by the traditionally rural sedentary agriculturalists and pastoralists

called the Kikuyu, who form the most dominant tribal group in Central Province, particularly in Kiambu District, from which this research's sub-sample was selected. On account of the physiographic variation (high ridges and deep parallel valleys) and of the rich vegetational (both natural and man-induced) cover, Region 2 is more "closed" than region 3, the "Masai Steppe". For more authentic and detailed descriptions of the traditional life of the Kikuyu, one can refer, inter alia, to Kenyatta (1938), Mwaniki (1973) and Ojany and Ogendo (1973: 102-103). For a comparative analysis of the problem of education and ethnicity with specific reference to the tribal groups of the Maasai, Kipsigis, and Kikuyu, reference can be made to King (1975). Figures IV.2, IV.10, and IV.12, pages 220/221, 230 and 238/239, respectively, illustrate the locational and related aspects of Region 2.

Region 3, or the so-called "Masai Steppe", is the comparatively, "remote" rural and dominantly undulating "open grassland" landscape. In terms of the thesis advanced by Segall et al. (1966), this is the landscape of extended vistas of the open savanna and in which the inhabitants traditionally live predominantly in circular or round houses, as opposed to the highly carpentred urban environment described above. In socio-cultural and economic terms, this region, which is mainly found in the Rift Valley Province, from which the representative research District of Narok was selected because of its relative ease of accessibility, is generally sparsely populated by the rural semi-nomadic pastoralists. The predominant group of these semi-nomadic herders, who are also currently adopting more sedentary agricultural practices at a gradual rate, are the Maasai, In the central, north and northern parts of the Province, such other tribal groups as the Kipsigis, Kalenjin and Turkana tend to outnumber the Maasai (see Figures IV.10, page 230). For other locational and related geographical aspects, reference can be made to Figures IV.2 and IV.12, pages 220, 221 and 238, 239, respectively.

As elsewhere in Kenya, the traditional Maasai society is steadily undergoing some modern developmental transformation. Thus, this region is characterised by a rich mixture of the traditional and relatively modern socio-cultural and economic practices, with the resultant general spatial

distributional patterns. However, the traditional rural Maasai people take so much pride in their traditional culture, or way of life, that they have only adopted the most essential practices and values from the "modern development-oriented" cultures. Thus, for example, and as the present writer was able to observe during his stay with the Maasai families of Messrs. Lepilal Ole Ntumo and David Ateti Ole Masikonde, in their traditional homesteads ("Manyattas"), which are situated in the Rotiani Location, to the north of Narok, life generally evolves round, and often depends upon, the welfare of the family's herds of cattle, sheep and goats. Thus, all other socio-economic activities take secondary priority; the young children and the adults all share in the most important duty of looking after the family herds. Against this traditional background, which is gradually changing as was noted above, it is not very surprising to find that children start formal schooling when they are older than their counterparts in Kenya's urban centres (see, for example, Table IV.2, page 233, and Appendix IV.1, page 459). For detailed accounts of some aspects of the traditional ways of living of the Maasai, the introduction and diffusion of the "modern-socio-economic development-oriented culture" into Masai-land, one can refer to, inter alia, Hazlewood (1979), Kesby (1977), King (1972, 1975), Lavers (1960) and Ojany and Ogendo (1973: 110-111).

Thus, given these somewhat contrasting physico-eco-cultural environmental and residential landscapes, which seem to place varying demands upon the conceptual, perceptual and experiential skills of residents in attaining complete and effective spatial and geographical orientation, it is deemed necessary to test the relative effects of the PEERE described above on the development of territorial decentration in the Kenyan sample of subjects. In this regard, it is predicted that, on account of their opportunities for experiencing the vast, more open and less-carpentred grassland environment while generally practising their traditional occupation of semi-nomadic pastoralism, and despite the modern tendency towards some forms of sedentary agricultural practices, subjects from Region 3 will tend to outperform their counterparts in Regions 2 and 1 on the TDT. Thus, it is expected that of all the subjects successfully attaining TDS.3, the greatest number will be comprised of those from Region 3, followed by those from Region 2. Lastly, Region 1 will

have the smallest number of territorially decentred subjects. Hence, the following hypothesis:

Hypothesis 6:

> It is hypothesised that there is no significant difference in the development of territorial decentration between Kenyan African children drawn from the remote rural, open grassland and least-carpentred environment of Region 3; the peri-urban/rural, high plateau, sub-humid, forested and more "closed" landscape of Region 2; and the built-up metropolitan urban and most carpentred-world environment of Region 1.

III.7 The Relationship between the Level of the Development of Space Concept or the Effectiveness of Spatial Judgment (LSCD or EOSJ) and the Development of Territorial Decentration

In concluding his investigation, Stoltman (1971: 59) suggested, inter alia, that 'the relationship which exists between territorial concept development and other Piagetian tasks, especially those by Inhelder and Piaget (1964/1969), is in need of researching'. Hence, the present attempt to examine the relative influence of the levels of the development of space concept, or the effectiveness of spatial judgment, of the subjects of this research upon their development of territorial decentration.

In Piagetian theory, the child masters a comprehensive co-ordination of view-points completely independent of his own point of view through a progressive developmental shift from egocentrism to relational co-ordination, and the equilibrium of fully reversible concrete operations. The process of spatial or territorial decentration, or the waning of spatial egocentricity, is held to be crucial to the child's increasing comprehension and differentiation of spatial or territorial reality in a tri-dimensional schema. This schema consists of depth or the "before-behind" or "near-far" dimension; horizontality or the "left-right" dimension; and verticality or the "up-down" dimension, and all of these dimensions with reference to an arbitrary specified locus of origin (Omari: 1976, 1977). The child is expected to correctly differentiate the depth (before-behind) dimension first, following it with that of horizontality (left-right). By the age of about 9 or 10 years,

he is expected to have attained the concept of verticality (up-down), the final equilibrium of concrete operations, and the ability to inter-co-ordinate all the schemata. In other words, the child is said to be able to decentre territorially or spatially from one point of view (egocentrism), to differentiate between his own and other points of view (perspectivism), to increase his understanding of reality in the environment around him and to integrate this co-ordination or equilibration of perspectives, all of which are essential to his development of territorial decentration (Piaget and Inhelder, 1956; Satterly: 1964, 1977; Laurendeau and Pinard, 1970; Garner and Plant, 1972; Hart and Moore, 1973; and Omari: 1976, 1977).

To determine the level of space concept or the effectiveness of spatial judgment operationally, Piaget and Inhelder (1956) developed a number of classical tasks which have been used cross-culturally (for example, Dasen: 1970, 1972, 1975a; Garner and Plant op. cit.; Omari, op. cit.; Satterly op. cit.). The most popular of these, and one that the present investigator considered appropriate for this research, is the "Three Mountains Co-ordination of Perspectives Task", which was standardised by Laurendeau and Pinard (1970).

Using the Three Mountains Co-ordination of Perspectives Task, the present investigator predicts that there will be a significant positive relationship between the level of space concept development, or the effectiveness of spatial judgment, and the development of territorial decentration amongst the Kenyan African children in the research sample. Furthermore, it may be expected that most of the subjects attaining the formal operational level of Spatial Stage 3, as determined according to their performance on the task described above, will also generally be found to have attained TDS.3. The following hypothesis will therefore be tested:

Hypothesis 7:

> It is hypothesised that there is no significant relationship between the level of the development of space concept or the effectiveness of spatial judgment, as measured by Laurendeau and Pinard's (1970) standardised version of Piaget and Inhelder's (1956)

"Three Mountains Co-ordination of Perspectives Task", and the development of territorial decentration in Kenyan African children.

III.8 The Relevance of Witkin's Field-Dependent and Field-Independent Cognitive Styles of Psychological Differentiation to the Development of Territorial Decentration

According to Witkin et al. (1977a), among the cognitive styles of psychological differentiation identified so far, the field-dependence and field-independence dimension (FD-FID) has been the most extensively studied and has had the widest application to educational problems (Witkin et al.: 1954/72; Witkin et al.: 1962/74; Witkin, 1976; and other works compiled in Witkin et al. (1973) and Witkin et al.: 1962/74).

In terms of Witkin's model of psychological differentiation, the FD-FID cognitive style hypothesis refers to the separation of the self from its environment or the field, employing primarily either visual or gravitational cues in determining the upright in space. The concept focusses on two areas of psychological functioning. The first one, which is specifically relevant to the present study, is the perceptual-cognitive or "restructuring" component which includes such behaviours as disembedding and analysis. The second component is social or "interpersonal competencies". It includes social sensitivity and attention to social cues at one end, and social distancing and autonomy at the other. In other words, the FD-FI cognitive styles are tendencies to function with greater or less autonomy of external referents, manifested in both the cognitive and social domains (Witkin et al.: 1977b).

According to this FD-FI hypothesis, while people found at the FD-end of the dimension tend to rely upon external referents in the development of restructuring skills, those at the FI-end employ internal referents. Thus, FI people not only seem to do well in cognitive restructuring tasks, especially those in the spatial domain, but also seem better able to achieve a different percept, when required by situational demands or inner needs, through restructuring of their initial perceptual experience. As a result, and due to their inability to develop

social sensitivity or interpersonal skills, these FI people are said to be socially-independent and distant in interpersonal relations. In contrast, and due to the inability to develop cognitive restructuring skills, the prevailing organisation of the perceptual field among the FD people is likely to be adhered to as given. As a result of their development of social skills, FD people tend to show more of the interpersonal competences involved in getting along with others than their FI counterparts. In conventional thinking, the FD-FI cognitive style dimension of psychological differentiation is bi-polar and neutral. It has no clear "high" or "low", "good" or "bad" poles, and each end or pole has qualities which are of value in particular circumstances. Thus, for instance, people who may be high on restructuring competence may tend to be low on interpersonal skills, and vice versa (Witkin et al.: 1977a; Witkin et al.: 1977b; and Berry, 1980).

The following experimental tests, each of which requires the subject to locate the upright by relying either on the visual field or the body itself as referents, have been used to establish an individual's standing on the FD-FID through his performance in the original (dark-room) Rod-and-Frame Test (RFT), which was eventually replaced by Oltman's (1968) more flexible portable version called the Portable-Rod-and-Frame Test (PRFT); the Body-Adjustment Test (BAT); the Rotating-Room Test (RRT); and the Embedded-Figures Test (EFT).

According to Witkin et al. (1977b), and as a result of relating performance on such tasks as the RFT to other cognitive dimensions which clearly feature spatial restructuring (for example: the Three Mountains Co-ordination of Perspectives Task), the substantial evidence accumulated so far is apparently consistent with the hypothesis that FI in perception of the upright is related to spatial restructuring ability (Gardner, Jackson and Messick, 1960; Gough and Olton, 1972; McGilligan and Barclay, 1974). The evidence relating to sex differences in the FD-FID was discussed in section III.3, page 136, of this chapter. As a result of cross-culturally applying the model of psychological differentiation as devised by Witkin and Berry (1975), and as shown in Figure III.1, page 155, it was possible to collect evidence which supports the hypothesis that members of the migratory or

ANTECEDENT FACTORS	CLUSTERING AT POLES OF DIMENSION		
ECOLOGY	MIGRATORY HUNTERS, GATHERERS, (AND PASTORALISTS)	<——>	SEDENTARY AGRICULTURALISTS AND PASTORALISTS
SOCIAL PRESSURE	"LOOSE" SOCIAL PRESSURE AND AUTHORITY	<——>	"TIGHT" SOCIAL PRESSURE AND AUTHORITY
SOCIALI-SATION	INDEPENDENCE, SELF-RELIANCE, AND ACHIEVEMENT EMPHASISED	<——>	RESPONSIBILITY AND OBEDIENCE EMPHASISED
BIOLOGICAL	(A) PROTEIN INTAKE ADEQUATE; NO ANDROGEN REDUCTION	<——>	PROTEIN INTAKE INADEQUATE; ANDROGEN REDUCTION
	(B) GENETIC SELECTION FOR DIFFERENTIATION	<——>	GENETIC SELECTION AGAINST DIFFERENTIATION
BEHAVIOURAL PREDICTION	HIGHER DIFFERENTIATION	<——>	LOWER DIFFERENTIATION

FIGURE III.1: THE CLUSTERING OF FACTORS CONSIDERED TO BE ANTECEDENT TO THE DEVELOPMENT OF PSYCHOLOGICAL DIFFERENTIATION

Source: Witkin and Berry (1975: 17).

mobile social groups not only display higher differentiation in their behavioural pattern, but they are also more field independent than their sedentary counterparts (Witkin and Berry, 1975; Witkin, 1978: 30-39; Werner, 1979: Chapter 9: 173-191).

With specific reference to the present study, in view of the foregoing observations, and by comparing the performance of the subjects on the PRFT and the TDT, it will be possible to determine the relationship between the FD-FI cognitive styles of psychological differentiation and the development of territorial decentration. Furthermore, it is considered reasonable to predict that:

a. the greatest number of FI subjects will be found among the Region 3 sub-sample, on account of their traditional subsistence economy and experience of the open eco-cultural environment, followed, in descending order, by subjects in Region 2 and 1; and

b. should a significant positive relationship between the two variables under discussion be found, a greater number of FI subjects will also be found to be territorially decentred, having attained TDS.3, than the FD subjects in this study's sample. Hence, the following hypothesis:

Hypothesis 8:

> It is hypothesised that there is no significant relationship between the FD-FI cognitive style dimension of psychological differentiation, as determined according to their performance on the PRFT, and the development of territorial decentration, as determined according to their performance on the TDT, in a sample of Kenyan African children.

III.9 The Relationship between Operational Logical Class Inclusion Ability and the Development of Territorial Decentration

Making his second suggestion for future research, Stoltman (1971: 58) stated that:

> Closer control over mental ability and/or reading scores and travel experiences must be exercised in future research. Those two variables, not treated in the present (Stoltman's) study, may contribute appreciably to an explanation of territorial concept development.

It is, firstly, in response to this recommendation that an attempt is being made in this investigation to examine the relationship between the Kenyan African children's operational logical class inclusion ability, as determined according to their performance in the Class Inclusion Test (CIT), using animals (Inhelder and Piaget, 1964; Opper: 1971, 1977; Dasen and Ngini, 1978; Otaala, 1973), and their development of territorial decentration.

Secondly, and as will be described in greater detail later, Sub-tests C and D of the main criterion instrument of this research (the TDT) require subjects to make behavioural-explanational responses on Territorial Inclusion, respectively using written symbols and props. It was thus considered appropriate to determine, independently and as objectively as possible, the subjects' logical understanding of the relations of sub-classes to overall classes in the class inclusion system, using items (animals) which are different from the territorial units and props directly employed in the criterion instrument, the TDT).

Thirdly, it will be noted that, due to reasons beyond the present writer's control, it was not possible to select and stratify the research sample using any such conventional intelligence tests as the Stanford-Binet Test or the Terman-Merrill Tests. It is thus hoped that the results obtained by administering the CIT to the present study's subjects will help to provide some objective indication of their general intellectual ability, and provide a basis for determining whether this ability and the development of territorial decentration are significantly related.

Against this background, therefore, it is generally predicted that the operational logical class inclusion (intellectual) ability of the subjects interviewed in this study will be so related to their performance in the TDT that the majority of those achieving totally-correct sub-class and class inclusion relations of animals will also attain TDS.3, and vice versa. The following hypothesis will therefore be tested:

Hypothesis 9:

> It is hypothesised that there is no significant relationship between the operational logical class inclusion ability of the Kenyan African children and their development of territorial decentration.

III.10 Summary

Within the compass of this third chapter, and in addition to discussing the qualitative aspects (rates and stages) of the development of territorial decentration, it was also possible to outline a number of independent descriptive variables considered to be crucial, either individually or interdependently, in explaining the possible variance in this study's dependent variable, namely, the development of territorial decentration. These independent variables are age, grade or year of schooling, sex differences, socio-economic status of the parents (SESP), physico-eco-cultural environmental and residential experience (PEERE), level of space concept development or the effectiveness of spatial judgment (LSCD or EOSJ), the field-dependent and field-independent dimension of cognitive styles of psychological differentiation (FD-FID) and the level of operational logical class inclusion ability.

A number of predictions were made about the way in which the factors named above are likely to affect the development of territorial decentration in a sample of Kenyan African children. The main theoretical reasons for selecting each of these factors for consideration in this study were discussed in the statements of justification preceding each of the nine (9) a priori hypotheses. These hypotheses, which were set up in null form, will be tested, independently or simultaneously, to determine the extent of the relationships between the independent variables and the development of territorial decentration in the Kenyan sample.

The theoretical considerations covered in this chapter have therefore formed the basis upon which the topics of methodology, the setting of this research in Kenya, sample characteristics and sampling procedures will all be described in Chapter IV.

III.11 Notes and References

1. In his original study, Stoltman (1971: 16-17) separately stated the three hypotheses designed to test the applicability of Piaget's theory of spatial stages thus:

   H_1- It is hypothesised that Piaget's spatial stages, using age fit one, are not comparable to the American sample's concept of territory.

   H_2- It is hypothesised that Piaget's spatial stages, using age fit two, are not comparable to the American sample's concept of territory.

   H_3- It is hypothesised that Piaget's spatial stages, using age fit three, are not comparable to the American sample's concept of territory.

   However, Stoltman (1976b: 41-42) grouped all these three hypotheses into one, which he stated thus:

   H_1- It is hypothesised that there is no significant difference between spatial stages development as postulated by Piaget and the development of the American sample on those same criteria (Stoltman, 1976b: 42).

2. Reference can also be made to Snedecor and Cochran (1967: 26-31) and Travers (1978: 282-283).

3. The Iteso (singular forms for male and female are, respectively, Itesot and Atesot) are the inhabitants of Teso District, Eastern Province, Uganda, and their tribal language is Ateso.

4. "P_1 to P_7" means, in Uganda's education system, primary class one, or the first year of primary school, through to primary class seven, or the seventh and last year of primary school, during which the Primary Leaving or Secondary School Entrance Public Examination is taken.

5. Some sex differences were reported by Eshiwani (1975) in a study he carried out to investigate whether there are significant differences in achievement and retention of mathematics between boys and girls in Kenyan high schools. He concluded that 'what is crucial in the achievement and the retention

of Kenyan boys and girls in mathematics is not their attitudes towards mathematics or expectations of their sex roles, but the method used in instruction;..... (and that while) arithmetic reasoning is a valid predictive variable for boys and girls, however, for girls, comprehension of mathematical terms and computational ability are important factors in mathematics performance' (Eshiwani, 1975: 3).

6. According to Werner (1979: 173), "cognitive style" is a concept that serves as a bridge between three different fields of child development, namely, perceptual, cognitive, and social development. Differences in cognitive style are related to biological, ecological, and social factors, all of which are also important in adaptive selection.

7. See also: Werner (1979: 164-165 and 178-179).

8. In summarised form, the eight measures introduced by the Kenya Government to enhance national unity were stated as follows:

   a. The government assumed central responsibility for education at all levels by removing that responsibility from various communal and religious bodies who managed the segregated system.

   b. The government accepted the principle of one teaching service and established the Teachers Service Commission as a central employer of teachers in Kenya.

   c. The government made funds available to assist poor children gain access to both primary and secondary education through a system of fees remission and bursaries.

   d. The government increased the number of boarding schools (national and provincial) to enable more children to attend schools. This was coupled with increased bursaries for African children attending the former European boarding schools.

   e. The government adopted a common medium of instruction so that no children were disadvantaged, and recently, the government introduced the teaching of Kiswahili at all levels so that those going to school are able to communicate with the people in the national language.

   f. .... The government made education free after the Kenya Certificate of Education-level (Ordinary Level School Certificate) so that only academic merit would be considered for admission to Form 5 and the University. (Currently,

primary education up to Standard 4 is free, and the Fourth Development Plan (1979-1983) aims at achieving free universal primary education of seven years (or nine years, should the nine-year primary education programme be implemented) - Part I of the Plan: 154) within the plan period. See also Kanina et al. (1976), Kinyanjui (1976), and Republic of Kenya (1975, 1976a, 1976c, 1976d.

g. For those going overseas for further and higher education, the government established a Central Selection Board, with representatives from each Province, to ensure that, apart from academic qualifications, there was equitable distribution of the available scholarships and bursaries regardless of tribe, race, religion and/or region of residence.

h. In teacher education, the district training colleges, which were parochial and denominational, were consolidated into a few national colleges, and district quotas for entering these colleges were established based on school population and need for various grades of teachers in each district (Republic of Kenya, 1976a: xiii-xiv).

PART II

EXPERIMENTAL ASPECTS OF THE STUDY

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CHAPTER IV

THE SETTING OF THE RESEARCH IN KENYA AND A DESCRIPTION OF THE RESEARCH METHODOLOGY, SAMPLE CHARACTERISTICS AND SAMPLING PROCEDURES

IV.0 Introduction

The first purpose of this chapter is to offer a descriptive outline of the setting of the present research in Kenya. This description will concentrate on the country's locational, areal, ecological (that is, physiographic, climatic and bio-geographical) and socio-economic aspects, and on the major features in the present organisation of Kenya's system of formal education. Attention is focussed on the formal education sector, as opposed to the non-formal one, because all the subjects in this research were drawn solely from institutions of formal education, namely, the primary and secondary schools.

The second purpose is to describe, in a general manner, the following aspects:

a. the research methodology (or the design and organisation of the study), including a re-statement of the experimental variables of this study;
b. the sample characteristics; and, finally,
c. the theoretical and practical aspects of the sampling procedure.

IV.1 The Setting of the Research in Kenya

IV.1.a General Geographical Considerations[1]

1.a.i. Locational Aspects

As shown in Figures IV.1, page 219, and IV.2, pages 220, 221, the Republic of Kenya lies athwart the Equator (0°), between latitudes 4°28'S and 4°40'N. Almost bisected by longitude 38°E, she is located on the eastern sea-board of the African continent, between longitudes 34°E and 42°E. With a territorial sea which extends to 21.2 kms (12 nautical miles) off-shore into the Indian Ocean, Kenya's coastline stretches for 608 kms from the Somali border in the north-east to north-eastern Tanzania in the south. Located in the south of this coastal

belt is Mombasa Port (population: 400,000), Kenya's most important gateway to and from the Indian Ocean, whose vast hinterland consists of such countries as Uganda, Zaire, Rwanda, Burundi and parts of northern Tanzania (see Datoo (1975), de Blij (1968), Sec. St. Cols. (1955), Hoyle (1973a) and Morgan, (1972)). With the completion of the D.T. arap Moi International Airport in the latter part of the 1970-1980 decade, Mombasa became Kenya's second largest and most important international air link with the rest of the world, after the Jomo Kenyatta International Airport in Nairobi. Bordered in the south-east by the Indian Ocean, Kenya shares boundaries with the Republic of Somalia in the east, Ethiopia in the north, the Republic of Sudan in the north-west, the Republic of Uganda and Lake Victoria to the west, and the United Republic of Tanzania to the south. With Tanzania and Uganda, she used to form the economic union of the East African Community which became defunct in 1977.

1.a.ii. Areal Considerations and Administrative Divisions

As Ojany and Ogendo (1973: 1) noted, Kenya has a total area of approximately 582,646.4 km^2 (227,596.3 square miles). Thus, whilst Kenya is equal in size to France, or about 2.5 times the size of Uganda, or 2.4 times as large as Great Britain, she can also be packed into Tanzania about 1½ times, or into China 16.41 times, or into the USA 16.07 times. Of her total area, the water surface (lakes and rivers) covers 13,392.9 km^2 (5,171 square miles) or 2.3%, and the gazetted national parks occupy 20,899 km^2 of the remaining dry land area[2], of which about 2/3 is either semi-desert or desert. Kenya's population of about 16 millions[3] has thus only between 142,313.5 and 189,561.3 km^2 (54,947.3 and 73,189.7 square miles) of profitably habitable land, the greater part of which is found in the wetter south-western portion of the country and the narrow south-east coastal strip along the Indian Ocean (Ojany and Ogendo, 1973: 1; Republic of Kenya, 1970a: 34-35; the International Year Book and Statesmen's Who's Who, 1981: 271).

In terms of political development, Kenya's history dates back to the Earlier Stone Age (about 2.6 million to 60,000 years ago) and the Iron Age (about 200 A.D. to the present). As evidenced by the archaeological artefacts which have been excavated in many places (the most significant

of which the Skull of Australopithecus Boisei (Zinjanthropus) Man, which was found by Louis and Mary Leakey, Kenya's famous palaeontologists, at the Olorgasailie Site on July 17th, 1959) most parts of Kenya have since those early times been inhabited by man (Republic of Kenya, 1973: 22-29). Whereas the Arabs were the first recorded foreigners to reach the coast of Kenya in the 9th Century A.D., they were followed by the Portuguese in the 16th Century A.D. The ruins of Gedi in Malindi and Fort Jesus in Mombasa are landmarks representing these historical periods of time.

Kenya's modern history began in the 19th Century A.D., first with the arrival of the European missionaries, and later with the construction of the Kenya-Uganda Railway. In 1901, Kenya was declared a British Protectorate, subsequently becoming a British Colony in 1920. While internal self-government was attained on June 1st, 1963 (MADARAKA DAY), Kenya became an independent sovereign state and a member of the British Commonwealth on December 12th, 1963 (UHURU DAY), and a Republic on December 12th, 1964 (JAMHURI DAY). On July 4th, 1974, Kiswahili was declared a national language to be used along with English throughout the country.

For internal administrative purposes, Kenya was finally divided into seven (7) large provincial units, in addition to one small metropolitan provincial unit (Nairobi), and into forty-one (41) administrative districts in 1968, as shown diagrammatically in Figure IV.2, pages 220, 221. Table 1V.1, page 222, shows, in order of decreasing size, the eight (8) provincial units, their respective areal sizes and headquarters. (See also Republic of Kenya, 1970a: 52-53).

1.b. Ecological Considerations

As shown in Figure IV.3, page 223, Kenya has one of the most complicated and diversified physiographic environments in East Africa. For example, this environment consists of tectonic, volcanic, aeolian, glacial, equatorial, tropical, sub-tropical, savannah, temperate and Afro-Alpine landforms and landscape types (see Republic of Kenya, 1970a: 4-13, and 22-23). With a structural geology which is dominated by a gentle dome-shaped asymmetrical shield, the land firstly rises gently westwards and northwards from the sea-level at the Indian Ocean coast

in the south-east to about 915m (3,000 ft). This area is called "lowland Kenya" and, with the exception of the south-eastern portion of the coastal belt, much of it is a "negative environment" in terms of socio-economic development prospects. Thereafter, the climb westwards becomes steeper, culminating in a maximum height of about 5,194 m (17,040 ft.) which is realised at the peak of Mount Kenya, a composite volcano and Africa's second highest mountain (see Figure IV.3, page 223). This highland area is called "upland Kenya", and it constitutes the wetter and more productive backbone of the country's socio-economic development activities, especially agriculture.

As shown below, the country's soil or edaphic types are as greatly varied in range and distribution as her geological structure and topography. Firstly, while the porous parent rock material and coastal sands of the coastal region generally give rise to low productivity and seasonally waterlogged lagoonal clayey and sandy soils, which have high contents of magnesium and calcium, there are patches of productive soils in such areas of alluvial deposits as the mouths of the Tana and Umba rivers. Secondly, the Duruma-Wajir and plateau foreland region has a variety of dark-red loamy, or latosolic, and sandy soils. Thirdly, though the Lake Victoria basin is generally characterised by a variety of productive soils which are derived from pre-cambrian rocks and associated intrusives, it also has extensive areas of low productivity latosolic soils which are associated with the granitic rocks found in the region. Fourthly, the highest Afro-Alpine moorland and grassland areas are characterised by soils which are poor, light, powdery and acidic. Fifthly, the lower parts of the Rift and associated highlands have some of the richest soils, which are called the dark-brown loams, and are derived from the early weathered volcanic material. However, since these highland areas receive very heavy rain, they are also characterised by intensive agricultural activity, and by higher human and animal population densities, all of which have led to rapid soil deterioration. Lastly, the semi-arid and desert areas of Kenya have a wide variety of soils derived from the Basement Complex system of gneisses and schists from Taru grits, from Duruma sandstones, and from various sands and alluvial materials. The main soil types are: yellow-red loamy sands (podzolic); dark-red sandy loams (latosolic); light-yellow brown

sandy loams with latosolic horizon; seasonally waterlogged very pale brown mottled loamy sands with latosolic horizon; and brown clay with impeded drainage (grumusolic) (see Republic of Kenya, 1970a: 26-27; Ojany and Ogendo, 1973: 99-111; and Ominde, 1968).

The main rivers include the Athi, Tana, and Ewaso Ngiro, which drain into the Indian Ocean; the Turkwell, which drains into Lake Turkana; the Mara, Kuja, Nyando, and Nzoia, which drain in Lake Victoria (see Republic of Kenya, 1970a: 22-23).

The climatic diversity characteristic of the country is largely a reflection of the influence of her great altitudinal range and varied topography. However, other factors determining the climatic conditions in Kenya include: the major wind circulation systems, which are themselves influenced by the large-scale pressure systems of the western Indian Ocean and adjoining continents; her location astride the Equator, and her position on the Indian Ocean sea-board. The country is, therefore, influenced by three main air masses, which are responsible for the regional variations in the annual rainfall total, its seasonality, and considerable unreliability, as briefly outlined below.

As shown in Figure IV.4, page 224, between December and March, much of western Kenya is dominated by the dry and dusty Egyptian air or the Harmattan from the Sahara Desert, while the eastern parts are influenced by the equivalent dry and subsiding air masses called the Arabian or north-east monsoons. During this period, much of the country is dry and hot, except for some pockets within the coastal belt. From March to May, parts of central, southern and eastern Kenya are influenced by the moisture-laden maritime south-east trade winds, which curve slightly to become the south-west monsoons on crossing the Equator. This is the period of the main long and heavy rains over much of Kenya. Between June and August, the influence of the south-west winds, the third air mass system, is strong. These winds are associated with the high and extremely unstable "Zaireois airstream", which blows in from Equatorial Africa and is responsible for the development of the convectional storms, which constitute the so-called "period of short and light rains", and the somewhat cool (cold in the higher parts) weather so typical during this period. From September to early December, the north-east monsoons

re-establish their warm to hot and dessicating influence over much of Kenya. Generally, the temperature conditions are extremely varied due to the influence of such factors as the altitudinal range, surface air masses, aspect, especially in the mountainous regions, oceanic and lake water masses, and natural and/or man-induced vegetational cover (see Republic of Kenya, 1970a: 20-21).

As Figure IV.5, page 225, shows, there are three main regions of heavy mean annual rainfall (also see Republic of Kenya, 1970a: 14-19). The first one is the belt extending along the Indian Ocean coast. The second region is in western Kenya, just to the east of Lake Victoria, and while the third region coincides with the major mountain ranges (see Figure IV.2, pages 220, 221), the factor of aspect causes local spatial variability so that the valley barriers and the leeward mountain slopes stand out as relatively drier areas. Figure IV.6, page 226, shows that Kenya's vegeto-ecological types, and her animal communities (Figure IV.7, page 227, are as greatly varied, spatially and in type, as her topography and climate are diverse. (See also Republic of Kenya, 1970 a:30-31, 56-57, 28-29, 58-59, and 60-61). Of particular relevance to the present study is the fact that although the three centres from which the subjects interviewed in this research were drawn (Nairobi, Kiambu and Narok) are all shown in this general map to be located in the "Grassland Communities" region (2), the local vegeto-ecological conditions are sometimes strikingly distinct. Thus, and according to the present investigator's observation, while both Narok and Nairobi are located in Vegeto-ecological Region 2d, their socio-cultural landscapes are very different; Nairobi is a built-up metropolitan and cosmopolitan urban industrial environment (or the so-called "highly carpentred" landscape), as opposed to Narok's "remote" and typically rural, low-rainfall, "scattered-tree and open-grassland or Masai Steppe" landscape (or, as noted in Chapter III, and according to Segall et al. (1966: 99-113), "the environment of extended vistas of open savannas"). The Kiambu sample (2), however, was drawn from a transitional zone between Vegeto-ecological Regions 1a, 2a, and 2d, with a greater tendency towards displaying characteristics of the wet "Highland forest and highland grassland" environment (1a). In socio-cultural terms, the Kiambu region is peri-urban or semi-rural.

On the basis of the inter-relationship between the locational, topographic, edaphic, climatic and vegeto-ecological elements described above, Kenya has been divided into eight (8) main geographical regions (Ojany and Ogendo, 1973: 42-49). As shown in Figure IV.8, page 228, these regions[4] are, with altitudinal ranges in brackets:

IV.1.b.i. The Coastal Belt and Plains (below 30 m to about 152 m);

ii. The Duruma-Wajir Low Belt (152 m to about 304 m);

iii. The Low Foreland Plateau (304 m to 915 m);

iv.a. The Western Highlands (1,520 m to 3,444 m), which are separated from the next region by the Great African Rift Valley;

iv.b. The Eastern Highlands (915 m to 5,194 m), which are dominated by the Tertiary-recent volcanic landscapes, including Mt. Kenya (5,194 m), the Aberdare Ranges (3,994 m) and the Nyambeni Range (2,513 m);

v. The Kenya Rift Valley (1,216 m to 1,824 m), which is typically stepped, has a number of younger volcanic plugs and cones in its floor (Menengai (2,279 m), Longonot (2,776 m), Silali (2,355 m), Suswa (2,355 m), and Shombole 1,564 m), and several lakes (Magadi, Naivasha, Elmenteita, Nakuru, Bogoria, Baringo and Turkana);

vi. The Nyanza Low Plateau (1,216 m to 1,520 m), which is structurally part of the down-warped Lake Victoria Basin, and has a series of parallel stepped faults and volcanic cones;

vii. The Nyanza Lowlands (914 m to 1,372 m), which is a low-lying swampy region, embraces the Yala-Nzoia Lowlands; and, finally,

viii. The Northern Plainlands (366 m to 912 m), which is the most extensive and remote region, covers the whole of Northern Kenya. With the exception of the Marsabit volcanic cone (1,428 m), this area is physiographically monotonous, and arid, with extensive sand plains and dunes, which are evidence of the dominance of aeolian processes.

1.c. Demographic Considerations

According to the most recent national census, which was held between 24th and 25th August, 1979, and whose detailed results are not yet

officially published, Kenya's population is about 16 millions (see Note IV.5.3, page 216). With an estimated current average annual rate of growth of 3.8 per cent (see UN, March 1981), which is still increasing, Kenya is one of the countries with the fastest growing populations in the world. Advances in public health, standards of living and the recent increased emphasis on the various aspects of rural socio-economic development (for example, adult education, water-supply, community and communication development) have resulted in a rapid decline in death-rates, particularly in the infant mortality rate. As Hazlewood (1979: 3) cautioned, though 'prognostications are unsafe', it is estimated that Kenya's population will be over 35 million by the year 2,000 A.D., taking into account the high national birth rate, which stood at 48 per cent in 1962 as compared with the then world average of 36 per cent. However, this high forecast figure might drop to about 28 million if there is either a decline in fertility, or if the current government's nation-wide Family Planning Programme, which is supported by UNICEF and similar organisations, is successful, or if both of these factors operate jointly.

As shown in Figure IV.9, page 229, with an average population density of about 15-20 per km^2, Kenya is not very densely populated. 50 per cent of the total population lives on 6 per cent of the land area. The average population densities range between about 150 to 600 per km^2 in those areas where land is classified as of high or medium potential, that is, only one-fifth of the total land area. These main population clusters are found at the coast, in the central highlands and around Lake Victoria (see Figure IV.9, page 229, and Republic of Kenya, 1970a: 48-49). The factors accounting for this uneven distribution of population include, inter alia, extreme aridity, low and unreliable rainfall and lack of permanent surface water-supply, especially in northern, north-eastern and southern-central Kenya; altitude, which limits the zone of human settlement to a height of 2,000 m, above which extreme cold and soil erosion conditions prevail; the colonial administrative policy, which created the negative "buffer zones" between tribal areas, particularly in the Rift Valley Province; such negative edaphic conditions as the seasonally waterlogged lagoonal clayey and sandy podsolic, soils of the coastal region, and most of the latosolic soils

associated with the Basement Complex system; and the occurrence of the tse-tse fly and malaria-carrying mosquitoes in some parts of the country (see Republic of Kenya, 1970a: 44-45, 46-47). Thus, the population density is well below 2 persons per km^2 in some of these areas of relatively low economic potential for agriculture or animal husbandry. These areas, which present those concerned with planning for socio-economic development with the greatest challenge, include the semi-arid and arid lands of the north, north-east and south-west Kenya.

Although the urban population is expanding at an annual rate of between 7 and 10 per cent, as a result of the increasing migration to the urban areas by the relatively younger Kenyans searching for office and industrial jobs, about 88.4 per cent of Kenya's population is rural. The major towns, which account for about 1,851,000 or 11.6 per cent, of the total population, are: Nairobi (950,000), Mombasa (400,000), Kisumu (170,000), Nakuru (106,000), Meru (83,000), Eldoret (57,000), Thika (46,000), and Nyeri (39,000). In addition, such other smaller centres as Kitale, Nanyuki, Malindi, Kakamega, Kericho, Kitui, Embu, Bungoma and Naivasha are also classified as urban centres, on account of their functions as administrative and commercial centres[5].

In terms of the racial or ethnic, age and sex composition of Kenya's population, the following characteristics are noteworthy. Firstly, one of the most striking features of Kenya's population is its racial or ethnic diversity, as it is comprised of Africans, the predominant group numerically, Asians, Arabs and Europeans. Ethnically, the African population is divided according to socio-linguistic criteria into three major groups. The first and largest of these is the Bantu-group, which belongs to the "Niger-Zaireous" linguistic family, and in which are found such tribal groups as the Kikuyu, who formed the majority of subjects in the Kiambu (2) sub-sample of this study, the Kamba, Luhya, Kisii, Meru, Swahili, Shirazi, Taita, Kuria and the Mijikenda. The second major linguistic grouping is the Nilotic group, and it is represented by the Luo, Kalenjin, the Maasai, who formed the majority of the subjects in the Narok (3) sub-sample of the present research, the Nandi, Kipsigis, Elgeyo, Marakwet, Pokot, Sabaot, Samburu, Turkana, Iteso, Njemps, Tugen and the Nderobo. The third group is the Cushitic or the "Eastern and Western Hamitic" group, consisting of the Gosha,

Hawiyah, Ogaden, Ajuran, Borana, Somali, Rendille, Galla, Ndorobo, Boni, Gurreh, Degodia, Orma, Sakuye and the Gabbra. Figure IV.10, page230, shows the approximate distribution of these tribal groups; (see also Republic of Kenya, 1970a: 50-51). As would be expected of any metropolitan urban centre, Nairobi's population is cosmopolitan, with all the major ethnic/racial and tribal groupings represented within its total number. It is thus not surprising that the sub-sample of subjects drawn from this Nairobi research region (1) is a mixture of several of the African tribal groups mentioned above.

The second important characteristic is that over 50 per cent of the total population is under 16 years of age, a percentage which is higher than in most of the tropical developing countries. Although the proportion of the non-working old people is relatively low, the young and old population groups jointly leave only about 48-50 per cent of the total population in the working-age groups. However, this situation is likely to change if the average longevity rises from the current 49-51 years, as compared with that of 71 years in Britain, to about 60 years of age, a development that will lead to a series of other planning problems, whose detailed discussion is out of the scope of this study. Another implication of the great youthfulness of Kenya's population is that the government has to divert tremendous resources into the education sector to ensure that the rapidly growing school age population is adequately educated and that the citizens who have not had the opportunity to undergo formal education are catered for through non-formal and/or continuing education programmes. The last important feature is that the sex ratio of the population is approximately 96.9 males per 100 females.

In concluding this discussion of Kenya's demographic features, it is significant to note that despite the racial and ethnic diversity of her population, there is equality before the law and a strong movement towards national unity. Hence, the need to remind the reader of Bascom's (1962) cautionary remarks regarding the problem of tribalism vis-à-vis national unity, which were cited at the end of Chapter II, (see Note II.9.3, page 119), and to which can be added another view succinctly expressed by two of Kenya's leading geographers and authors in the following words:

> It is doubtful that tribes should be emphasised in a "modern" Kenya. Kenyans should begin to abandon tribal differentiation in their vocabulary. This must be an urgent prelude to a strong, forward looking Kenya people with a united purpose...
>
> Ojany and Ogendo, 1973: 119).

1.d. Some Economic Considerations

Of all Kenya's sectors of socio-economic development activity, the agricultural one is by far the most important. While it directly contributes 35 per cent of the country's gross national domestic product and employs 75 per cent of the total population, it also supplies about 50 per cent of Kenya's exports. The most important crops are coffee, tea, sisal, pyrethrum, sugar-cane, wheat, maize, rice and cotton. A wide variety of forest types is found in Kenya, varying from the coastal mangroves to the coniferous mountain forests, with some pockets of the tropical rain forests, especially along the coast. The Reserved Forest area covers over 17,000 km^2 (see Republic of Kenya, 1970a: 56-57). The country's mining industry seems to be growing steadily, with the most important minerals being soda ash, limestone, fluorspar, lead, silver and a variety of gem stones.

As expected of a predominantly agricultural country, Kenya's most important industrial activity is based on the processing and manufacturing of such agricultural products as sugar, wheat and maize flour. Other activities include beer brewing, manufacturing of paper, cement, chemicals, shoes and textiles. Light heavy industrial activity includes the manufacture of tyres and the assembling of trucks and other motor-vehicles. According to the Fourth Development Plan (1979-1983, Part I: 96), 'exports of goods are expected to grow at a rate of 5.8 per cent', thereby reflecting 'the substantial growth planned for agriculture, and the planned expansion of manufactured exports'. However, set against this growth will be 'a more rapid growth rate of 6 per cent for the imported goods, though the actual use of imported goods will grow at only 5.4 per cent by 1983'. Another promisingly growing industry, and one that earns Kenya a substantial amount of foreign revenue, is her tourist trade, which is largely based on an immense and diverse wealth of wild game preserved in her 15 National Parks and 22 Game Reserves which are spread all over the country (see Figure IV.7, page 227).

Thus, in 1979, Kenya was visited by about 350,000 foreign tourists. Hence, the current emphasis on the improvement of such infrastructural facilities as communications (road, rail, air and water), and the need to increase the number of hotels and lodges to provide the necessary accommodation for the increasing number of tourists (also see Chapter 11 in the Republic of Kenya, 1973: 125-149). The Kenya Utalii College, Nairobi, trains the required local personnel to work in the expanding hotel and tourist sectors of Kenya's economy.

IV.2 Some Salient Features of Kenya's System of Formal Education

This section briefly describes some of the salient features of the development and organisational structure of Kenya's system of formal education[6]. This survey will help to form the basis for an understanding, in comparative terms, of the country's current general policy and practice for the provision of education services to the population through her institutions of formal education from which the subjects involved in the present research were drawn. Thus, since Kenya, like such other former colonial territories as Tanzania and Uganda, inherited her system of formal education mainly from Great Britain, her former metropolitan state, with some contribution from a number of other European missionary organisations, an attempt will be made, wherever appropriate, to outline the various ways in which the features of the systems of education in the two countries (Kenya, and England and Wales) are similar or different. For a detailed map showing educational facilities in Kenya, the reader is referred to Republic of Kenya, 1970a: 72-73.

Before Kenya attained her political independence in 1963, her system of formal education was characterised by a number of features. Firstly, much of her system of formal education was largely controlled by various Christian missionary organisations from Britain and such other European countries as France. In the coastal areas and inland trading centres, Moslem missionaries established Koran schools (see, for example, Gatu, 1976). Thus, most of the primary and secondary schools in Kenya owe their present existence to the work of these early missionaries. Nevertheless, and secondly, during the 1950-1960 decade the Central Government, then faced with a rising demand for more trained local personnel to occupy posts in the civil service and other sectors

of the national economy, increased its contribution to the provision of formal education services. This was effected either by giving government grants-in-aid to a number of missionary-founded schools and colleges, or by directly establishing and financing such institutions of higher learning as the then Royal Technical College, Nairobi, now known as the University of Nairobi (UON), the Egerton National Agricultural College, Njoro, and the Kenya Polytechnics in Nairobi and Mombasa. Thus, while the policy and practice in the provision for primary education was dominantly a missionary concern, with some control from the local district and provincial authorities, this formal education was generally provided to the citizens on denominational grounds. In the urban areas, provision of formal education was not only denominational but it also segregated the population on racial grounds. It was therefore common to find African, European and Asian schools existing separately in the same location of a small town but offering a similar general curriculum to their respective racial school populations.

The second feature of the formal education system in pre-Independence Kenya was the imbalance in the distribution of formal education opportunities and facilities. Thus, though the majority of Kenya's population is rural, the urban areas tended to be more favoured in terms of the provision for formal education - they had a greater number of schools, which were also better in quality, than the rural areas. The surprisingly simple explanation for this anomaly was that 'the normal traditional practices of rural parents in encouraging the responsible activities of very young children and of caring for children in large family groups seemed to offer a sound basis on which to build more formal education at a later date' (Republic of Kenya, 1973: 151).

Finally, the nature of the curricula in schools and colleges did not bear effective relevance to the life, needs and aspirations of the Kenyan people. However, if viewed in proper perspective, this fact should not be very surprising because Kenya had to rely, inevitably, on the services of foreign expatriate educational personnel who were sent there through the good-will of foreign nations, individuals and organisations. For example, even as late as 1968, five years after Independence, while only $33\frac{1}{3}$ per cent of the qualified secondary school teachers in Kenya were Kenyan citizens, of the qualified graduate teachers, only one-seventh were Kenyans.

As a result of the foregoing features, the first post-Independence Kenya Government saw a need to deal with, inter alia, the following problems regarding the country's system of formal education:

a. to place high priority on the training and supply of top-level man-power;
b. to effect rapid increase in the volume of education at all levels;
c. to change fundamentally the nature and quality of the curricula in formal education to make it more effectively relevant to Kenya's local needs and aspirations, or to enhance the so-called "renaissance of local culture";
d. to desegregate, and to eliminate all divisive denominational controls in, education so as to facilitate the development of national unity and integration through the education of citizens in multi-racial or ethnic and multi-religious socio-cultural environments;
e. to localise the teaching profession;
f. to develop a realistic national language policy; and, finally,
g. to develop and increase awareness of African Socialism as defined by the Republic of Kenya's (1965) Sessional Paper No. 10 (see Republic of Kenya: 1973: 150-151).

To help establish appropriate priorities in view of the immediate and most urgent national needs as they occur and/or change at various times, the government devised a method of instituting various Commissions to review the existing policies and practices and to suggest, through recommendations, various guide-lines upon which subsequent decisions of government formal policy can be based. Hence, the significance attached to the need for ensuring an understanding of the recommendations contained in the reports of such Commissions, which are normally known by the names of their respective Chairpersons, as the "Ominde Report" (1964a), which preceded the enactment of the Kenya Education Act of 1968 and is the equivalent of Uganda's "Castle Education Report" (1963), the "Bessey Report" (1972), the "Gachathi Report" (1976); and indeed, the respective sections dealing with matters of formal education in the various National Five-Year Development Plans, in addition to the Teachers Service Commission Act (1966) and the University Act (1970), all of which are formal statements of official policy and provide the

framework for a national system of education (see Republic of Kenya, 1979a: 154).

In terms of administrative organisation and according to Section 3(1) of the Education Act (1968), an organisational structure was set up in the Ministry of Education (MOE) '... to promote the education of the people of Kenya and the progressive development of institutions devoted to the promotion of such education and to secure the effective co-operation of all public bodies concerned with education....'. While the MOE's headquarters are in Nairobi, there are also 8 provincial and 39 district education offices and a corresponding number of Provincial and District Education Officers who are respectively responsible for field educational administration. The ministry is run by the Minister of Education, who is responsible for all political decisions relating to the general national educational policy. This Cabinet Minister is assisted by the following permanent civil servants: the Permanent Secretary, who is responsible for general administrative matters; the Director of Education (formerly the Chief Education Officer), who is responsible for the effective functioning of the Inspectorate, the Examinations System, the Primary School Advisory Service and the Kenya Institute of Education; the Principal Assistant Secretaries; Senior Education Officers, Assistant Secretaries and Education Officers. All these officers are at the headquarters in Nairobi and they are all responsible to the Minister of Education through their respective permanent civil service heads.

The primary schools are under the management of Primary School Committees and the Parent-Teacher Associations, as set up under the Education Act (1968), which did not, however, properly define the specific managerial functions. The secondary schools and post-secondary educational institutions are, according to the Education Act (1968), run by Boards of Governors, which are, nevertheless, limited in their operational powers in respect of staff appointments, admission of students and discipline of both staff and students. According to the Teachers Service Commission Act (1966), which established the Teachers Service Commission (TSC), and the Education Act (1968), the functions mentioned above were centralised either at the Ministry or TSC headquarters in Nairobi. The District Education Boards were given legal powers 'to superintend the

management of public (that is, government-maintained national) schools' (Education Act, 1968) (see also Republic of Kenya, 1976: 143-146).

Currently, however, and with effect from 1979, the control of Kenya's system of formal education is entirely the responsibility of two ministries, which were created by splitting up the old MOE, namely, the Ministry of Basic Education and the Ministry of Higher Education. As will become apparent later, these two ministries provide jointly all the services in Kenya which are provided by the Department of Education and Science (DES) for England and Wales. The headquarters for these ministries are in Nairobi, with the same administrative set-up as that outlined above for the MOE.

The Ministry of Basic Education is responsible for the administrative organisation, school curricula and supervisory services of the country's pre-primary and primary education system. In addition, through the auspices of its parastatal body, the National School Feeding Council of Kenya, this ministry is also charged with the responsibilities of identifying, promoting and co-ordinating school nutritional programmes for an increased number of primary school children and of organising a co-ordinated national school feeding programme (see also Republic of Kenya, 1979a: 155).

As its name suggests, the Ministry of Higher Education is responsible for the administrative organisation, curricula and professional training programmes of all the country's institutions of higher formal learning, including secondary schools, polytechnics, teacher training and other vocational training colleges, Harambee[7] institutes of technology and the university. In addition, this Ministry is also responsible for the selection of candidates for the various courses in overseas countries, for the equitable distribution of any scholarships which various friendly foreign countries award to Kenya and for ensuring that all students pursuing courses in these foreign countries are looked-after and complete their courses properly.

Additional services of a specialist nature are provided by what are known as the "Education Support Services" (see Republic of Kenya, 1979a: 167-170) and they include the parastatal bodies or sections outlined below:

a. The Inspectorate, whose main function is to maintain and improve educational standards. During the 1979-1983 Plan period, it undertook to fulfil the following objectives:

(i) to supervise closely the development and implementation of the new primary and secondary school curricula;
(ii) to guide and assess the work of all schools, including "Harambee" or self-help and private schools;
(iii) to intensify in-service education and training for all teachers, including lecturers in teachers' colleges; and,
(iv) to advise and guide heads of educational institutions and teachers on their professional work and responsibilities.

By 1983, the Inspectorate is expected to have 54 inspectors at the headquarters in Nairobi, 60 secondary and teacher education inspectors in the provinces, 97 primary school inspectors and 300 assistant primary school inspectors in the districts (Republic of Kenya, op. cit.: 167).

b. The Examinations Section, which is divided into a number of units. The new Kenya National Examinations Council, formed in 1980, took over the duties and functions performed formerly by the now defunct East African Examinations Council (Kenya and Uganda), whose headquarters were in Kampala, Uganda. This body develops, and supervises the administration, marking and preparation of results for, all public examinations leading to the awards of the Kenya Certificate of Education (KCE) and the Kenya Advanced Certificate of Education (KACE), the equivalents of the GCE Ordinary and Advanced Level Certificates respectively. In addition, it performs these duties for all the public technical and related professional examinations, for example, the City and Guilds examinations. A second unit is the Examination Secretariat, which is attached to the Inspectorate and deals with all matters relating to examinations and awards in Basic Education. These include: the Certificate for Primary Education (CPE), which is awarded after seven years of formal primary education, the Kenya Junior Secondary Examination (KJSE), which is taken mainly by candidates in "Harambee" secondary schools at the end of Form II (the second year in secondary school), and the examinations and awards for all primary teacher training colleges. These two units work very closely and share the facilities and services of a third unit called the Examinations Research and Development Unit, which

is concerned with carrying out continuous research and analysis of the examinations. It is proposed to set up another unit which will co-ordinate all examinations in the public and private sectors (Republic of Kenya, ibid.: 168). However, it is probable that the new Kenya National Examinations Council will be expanded to perform all the co-ordinating functions mentioned immediately above. (See also Makau: 1976a, 1976b; Republic of Kenya, 1976a: 131-142).

c. The Kenya Institute of Education (KIE), which is the equivalent of the Schools Council in England and Wales, is a parastatal institution of the Ministries of Basic and Higher Education. Its main function is to co-ordinate all programmes concerned with the innovation, planning, development, implementation and renewal of the various curricula for schools and colleges in the whole country. To enable it to perform its functions effectively, the Institute maintains very close links with the Ministries concerned with education, schools colleges, the University and all research organisations, particularly the National Council for Science and Technology (NCST), which operates under the umbrella of the Office of the President and controls all matters relating to research undertaken in and about Kenya. The Institute also controls the functions of the Education Media Service, which operates the educational radio and television services for schools and colleges, and of the Learning Resource Centres and Teacher Advisory Centres, which are also concerned with the improvement of the teaching and learning processes throughout Kenya. Occasionally, the Institute organises in-service education and training courses for all types of educational personnel.

d. The Teachers Service Commission (TSC), which was, as indicated above, instituted by the 1966 Act of Parliament, is responsible for the appointment, posting and the payment of salaries of all teachers in the country centrally. As it is also responsible for maintaining proper discipline in all institutions of formal education, it has the powers to dismiss any teacher on proven grounds of gross misconduct. In terms of size and organisational structure, and as a unified professional service, it is only challenged by its counterpart the Public Service Commission, which controls all matters relating to the employment of all civil servants. The current plans are to co-ordinate its services more closely with a view to making its role more efficient

and effective throughout the teaching service, to establish operational posts of the TSC at district and provincial levels and to decentralise the payment of teachers' salaries to provincial and district levels (see Kamunge (1975, 1976) and Republic of Kenya, 1976a: 145-146, 148; 1979a: 153).

e. Teachers Advisory Centres (TAC) are, as shown above, under the administrative umbrella of the KIE and are concerned with the in-service education and training of teachers and the development of new educational ideas and teaching/learning aids. To help ensure that the needs of the teachers are met effectively, TACs are spread out in district and provincial towns and rural areas and they operate closely with the Learning Resource Centres.

f. The Educational Materials and Equipment Service, which is based at the KIE headquarters, is concerned with ensuring that all the basic educational materials and equipment required for educational instruction in schools and colleges are 'available in the right qualities, quantities and at the time they are required ' (Republic of Kenya, ibid.: 168-169). The main institutions within this service are the KIE, the Jomo Kenyatta Foundation (JKF), the Kenya Literature Bureau (KLB), which replaced the defunct East African Literature Bureau in Kenya, the Science Equipment Production Unit (SEPU) and the Kenya School Equipment Scheme (KSES).

While the KIE, JKF, and KLB are jointly charged with the responsibilities of publishing, printing and marketing of all educational materials at reasonable prices, thereby making them easily available to schools and other educational institutions, the SEPU, which is located at the Kenya Science Teachers College, Nairobi (KSTC), specialises in the design, development, production and publicising of low-cost science teaching/learning aids and equipment kits for use throughout Kenyan educational institutions. The KSES, on the other hand, is responsible for supplying educational equipment and materials mainly to primary schools in which the current need is arguably greatest in comparison with the secondary and other tertiary educational sectors. As will be shown later in this chapter, the KSES has been able to perform its functions effectively by building school equipment stores at, and delivering equipment directly to, district headquarters throughout Kenya;

encouraging primary school committees and parents' associations to build equipment stores on Harambee basis; and increasing transport and other facilities for efficient handling and delivery of school equipment. (Republic of Kenya, ibid.: 169).

g. The Guidance and Counselling Service, which was introduced in 1971, concentrates effort on guiding primary and secondary students into various career opportunities in Kenya's modern sector of the economy. Amongst its current development plans are an increase in efficiency through:

i. the appointment of 8 professionally qualified officers who will be responsible for co-ordinating and organising workshops for teachers involved in guidance service work, and
ii. ensuring that guidance and counselling form part of the teacher training curriculum in all teachers' colleges and at university level (Republic of Kenya, ibid.: 168; see also Gituku (1976), Kanji (1978) and Watuma, 1976).

Before describing the various sections which constitute the instructional structure of Kenya's education system, it is necessary to highlight some of the major developmental features of the system. The first is that the government is heavily committed to the further development and improvement of the education service. Thus, while it allocated a 25.6 per cent share in recurrent expenditure and 2.6 per cent in the development budget to education in 1979, it also undertook to abolish all major fees and levies to make primary education universal and free as early as possible, to make special efforts to reach at least 10,000 pupils annually in the remote rural areas of Kenya by 1983 and to ensure an increased orientation in the primary school curriculum towards preparation for employment at this stage since most pupils may not have the opportunity to go beyond the primary school level. To facilitate the achievement of the last objective, the government proposed to raise the level at which the CPE examination is taken from the end of the seventh to the end of the ninth year of primary school (see Figure IV.11, pages 231, 232). A direct result of these measures, which is also the second developmental feature, is that enrolments in primary schools will substantially increase from 3 million or 85.6 per cent of the six-to-twelve-year-old children in 1978 to a proportion of over 95 per

cent by the end of 1983.

Thirdly, in contrast with the policy and practice in England and Wales wherein education until the age of 16 years is compulsory, universal, and free, with the exception of a relatively small private sector of independent schools, education in such a developing country as Kenya is not as yet compulsory, universal and free. Currently, however, while the government operates a bursary system for students in the Sixth Form, and for those in colleges, it maintains all students at university level by giving them grants in the form of loans which they have to pay back when they start working. Nevertheless, as a result of the considerable rise in the cost of secondary education in recent years, which placed a heavy financial constraint on the government budget, the government is currently reviewing the structure of secondary school fees to ensure that parents contribute more at this level. This will enable the government to concentrate its efforts on speeding up the programme of making primary education free and universal (see Republic of Kenya 1973: 150-161; 1976 and 1979a: 154-157). The most important implication of the government's policy is that there are a number of children who will be forced to "drop out" of the formal education system not because they are academically incapable but on account of their parents' and/or guardians' sheer inability to raise the required fees. One hopes that such children will be assisted in some way to complete their education.

The fourth feature in Kenya's modern educational development is the significant contribution made by all Kenyans through various "Harambee" (self-help) and "private"[8] efforts to supplement the official government efforts. As shown in Figure IV.11, pages 231, 232, the various government-aided/maintained and/or-assisted institutions[9] of formal education exist alongside similar "Harambee" and "private" institutions, with the exception of the university education sector. Thus, for example, of the total secondary enrolment of 320,310 in 1977, while 128,324 students were in only 444 secondary-aided (maintained and assisted) schools, a greater number of 191,986 students were in a comparatively greater number of 1,042 unaided "Harambee" and private secondary schools (Republic of Kenya, 1978: 50-51, and ibid.: 157). Another area in

which the "Harambee" effort has been concentrated is in the establishment and running of 12 "Harambee" Institutes of Technology throughout the country, with a further 3 planned to open by 1983 in Ukai, Embu and Meru (see Republic of Kenya, ibid.: 162, for a detailed list of the location and enrolment of each of these institutes). In recognition of the contribution these institutes make towards the fulfilment of the training needs of primary and secondary school-leavers, the government raised its current basic grant per student from K£80 to K£130[10] per annum as from 1978. It also decided to extend the life-span of the co-ordinating committee which was set up within the Ministries of Basic and of Higher Education to guide the institutes in their planning and development, to administer the government grant-in-aid system to the institutes in accordance with the government stipulated training priorities and to make arrangements for the auditing of all the funds made available to the institutes thereby making them accountable to a central administrative authority (Republic of Kenya, ibid.: 161).

In the fifth instance, the Third Five-Year Development Plan (1974-1979) period witnessed substantial expansion within the secondary education sector; secondary education enrolments increased from 30,000 in 1963 to over 350,000 in 1978 (Republic of Kenya, 1979a: 152). However, the government's strategy during the current Development Plan period is to shift emphasis in educational development from a mere quantitative expansion to one which is diversified, functional and of improved quality. To date, emphasis has been so significantly laid on science and mathematics subjects that, for example, in 1976, for the first time since the establishment of Form V science classes, science-based candidates filled all the available vacancies. Currently, though, the government is reviewing the present pattern of curricula so as to consolidate the existing system, and to establish a new pattern. This pattern will help to meet the country's man-power needs for qualified and skilled craftsmen, technicians, graduates and other professionals. To achieve the objectives outlined above, courses will be mounted in a network of educational institutions run by the public, private and voluntary organisations (refer also to Eshiwani (1976), Makau (1976c), Oluoch (1976) and Wood, 1976). As a direct result of this redirection of educational emphasis towards the development of more technical and

vocational skills at all secondary, higher and tertiary educational levels, the employment of skilled technical expatriates will be so progressively reduced that Kenyan citizens are expected to fill up to 95 per cent of the country's high and middle level man-power requirements by 1983 (Republic of Kenya, ibid.: 103).

Admittedly, a detailed consideration of Kenya's system of non-formal aspects of adult and life-long continuing education is outside the scope of this restricted experimental investigation of the development of territorial decentration in Kenyan schoolchildren. However, given the fact that a substantial section of the Kenyan population misses out on reaping the benefits provided by the formal education sector especially in the rural areas, it is imperative to highlight the developments within the non-formal education sector. At the outset, it is important to note that the responsibility for adult and continuing education is vested with the Board of Adult Education, which is based in the Ministry of Housing and Social Services. The Institute of Adult Education is the main institution directly concerned with the development, implementation, evaluation and renewal of curricula in adult and life-long education. It operates under the auspices of the Board named above and the Ministries of Basic and of Higher Education, the grant-awarding authorities. In specific functional terms, the Institute is situated on the Nairobi campus of the University of Nairobi (UON), with the Extra-Mural Studies headquarters at Kikuyu, near Nairobi. Amongst the most significant specific functions of the Institute is to contribute towards the various government efforts of eradicating illiteracy so as to enable the majority of Kenyans to break out of the vicious circle of the problems caused by disease, ignorance and poverty. According to the Literacy Survey undertaken in 1976/77, the reading ability in any language in the rural areas was limited to 65 per cent of the male and only 31 per cent of the female populations over the age of 15 years (see Republic of Kenya, 1979a: 103, Kihumba (1976). Thus, the Institute has the duty of co-ordinating the Mass Literacy Programme designed to teach most of the 4 million illiterate adults in Kenya how to read and write by 1983. Enrolment in literacy classes, which rose from 35,000 to 200,000 in 1979, is expected to rise gradually to 1 million by 1983 (Republic of Kenya, 1976a: 100-106; and ibid.: 186).

The Institute of Adult Education also co-ordinates the activities of the Continuing Education Programme. This is a post-primary school education literacy programme for those wishing to pass examinations at the CPE and higher levels, and for those who have left the school system, having failed the CPE examination, but who wish to complete their primary education. Much of the work in this programme is done through the correspondence system of instruction which is organised by the Correspondence Courses Unit of the Institute at UON. In addition, the Institute co-ordinates the work of the Vocational In-service Programme, which is concerned with the improvement of occupational skills of all types and grades of workers, especially in the urban areas (see Krystall, 1976a, and Macharia, 1976).

To enable the Board and the Institute of Adult Education to carry out their duties efficiently and effectively, District and Provincial Adult Education Committees were established with an increased local people's representation to ensure their full participation in the planning and execution of the programme in collaboration with the District and Provincial Development Committees. Furthermore, the services of the national radio, television and the urban and rural press all play a pivotal role in the implementation of the adult and life-long continuing education programme. The Ministry of Housing and Social Services has proposed the establishment of a National Adult Education Centre, which will function as a national resource, documentation production and training centre, thereby ensuring the necessary support to the multi-media programmes and the provision of curricula and resources to all rural adult training institutions throughout Kenya (see Republic of Kenya, ibid.: 187). These efforts will also be, and are already being, supported by the National Library Service.

Returning to the consideration of the developmental features of the formal education system, one can note, lastly, the success Kenya has achieved so far in the area of distributing formal education opportunities fairly equally amongst boys and girls, and in the provision of education to the various types of handicapped and disabled people in the country (see, for example, Krystall (1976b); Kenyatta and Abila (1986), Republic of Kenya (1964b), Swansbury: 1976a, 1976b). For example, in 1964, out of a total primary school enrolment of 1,014,719,

657,635 were boys and only 357,084 were girls. However, by 1977, the number of girls in the primary schools had so risen that of the national total enrolment of 2,974,849, 1,387,429 were girls and 1,587,420 were boys[11] (Republic of Kenya, 1978: 36). In the field of special education, while much of the work had in the past been done by voluntary organisations with some assistance from the government, the latter committed itself to assuming greater direct responsibility in the provision of special education. Thus, in addition to the plan of establishing a committee of representatives from the Ministries of Housing and Social Services, of Basic and Higher Education, and voluntary organisations to co-ordinate the work of all voluntary and government agencies providing educational services to the handicapped, the government also undertook to extend its assistance to the fields of pre-primary special education, the establishment of sheltered workshops and the provision of adequate equipment for the handicapped. Thus, while the total enrolments in special education schools were projected to rise from 3,449 in 1979 to 6,180 in 1983, the government undertook to increase its allocation of total recurrent expenditure from KShs.403,000 to KShs.644,000 and total development budget from KShs. 80,000 to KShs.200,000 in 1978/79 and 1982/83 respectively. The various special education institutions include primary, secondary, technical and vocational schools located throughout the country for the wide range of handicapped people (for example, those who are handicapped physically, visually, mentally and so on) (see Republic of Kenya, 1976a: 73-78 and ibid.: 159-160).

In terms of structural organisation, and excluding the early period of infancy, Kenya's system of formal education is comprised of six main institutional elements or levels which are outlined below and illustrated diagrammatically in Figure IV.11, pages 231, 232 :

IV.2.1 The Elementary or Basic Primary Education Level, which consists of two sub-stages:

2.1.a. The Pre-primary Education Stage is comprised of child-care centres and nursery schools which are founded either by civic authorities in the urban centres, or by individuals and/or voluntary organisations on "Harambee" basis. With the increasing demand for formal primary education, the demand for pre-primary education has also risen, resulting in a corresponding proliferation of child-care centres and

nursery schools of varying qualities. While the responsibility for pre-school care of children is vested in the Ministry of Housing and Social Services, the Ministry of Basic Education is currently more involved in this field of educational provision. Through the latter's KIE, measures are being taken to produce personnel with the necessary teaching skills in pre-primary school education (see Kanina et al., 1976).

2.1.b. The Formal Primary School Education Stage, whose length was 8 years until 1967 and is currently 7 years, starts officially at the notional or actual chronological age of about 5 years and ends at the age of 12 years. However, whereas this official age-range is realistically observed by authorities and parents in the modern urban centres of Kenya, it is common to find children in the rural areas starting their formal school career when they are much older. This is, firstly, due to the various demands traditional society places on the youth, for example, the need to ensure their full participation in the duties and social rituals of the respective societies and areas in which they live. Secondly, due to the fairly long distances children in rural areas sometimes have to cover between their homes and schools, parents are not always happy to let their 5-year old children travel such long distances. However, as the number of schools is increasing and as these schools become more evenly distributed throughout the rural areas, it may be anticipated that more parents will begin to observe the official regulations regarding the age at which children are expected to start formal schooling.

At the end of the seventh year of primary school, the pupils take the CPE examination (b_1)[12], which is the equivalent of the Eleven-Plus (11+) examination in England and Wales. Those who are very successful enter the government-maintained and/or assisted secondary schools (e_1), while the rest either join the various "Harambee" secondary schools or village polytechnics (d) for some elementary vocational qualifications (V.Q.), or take up some unskilled employment. The proposed 9-year primary education programme (c) will help to ensure that those children failing to qualify for further education join the employment sector at an older age of about 13 years.

In addition to introducing the free milk scheme and feeding programme for all primary schools and the abolition of building and other school

fees in primary schools, the government has also undertaken to fulfil the following objectives by 1983:

a. to build primary boarding schools, or the so-called "Arid Zone Education Centres", in the districts of Garissa, Isiolo, Kajiado, Mandera, Marsabit, Narok, Samburu, Tana River, Turkana (2 centres), Wajir, West Pokot, Baringo East and Lamu to provide an additional total of 3,600 primary boarding places in schools which will also serve as centres of adult and vocational education and training (Republic of Kenya, 1979a: 154);

b. to review the primary school curriculum so as to strengthen the teaching/learning of mathematics, science and pre-vocational subjects;

c. to strengthen further and to expand the primary school supervisory services to ensure that there is one inspector for every 30 schools; and, finally,

d. to phase out gradually all untrained primary school teachers (Republic of Kenya, ibid.: 155).

As a result of these measures, primary school enrolments are projected to grow, at an annual rate of 3½ per cent, from 3,274,000 in 1979 to 3,683,000 in 1983. The number of primary school classes will increase from the projected figures of 90,932 for the districts and 4,172 for the municipalities, in 1979 (with a projected total of 95,104) to 104,406 and 4,501 for the districts and municipalities, respectively, by 1983 (resulting in a projected total of 108,907)[13] (ibid.: 155). Furthermore, on the basis of a general formula of "one teacher per class including the head teacher" for all areas, while the primary school teacher requirements were projected to be 92,751 in the districts and 4,255 for the municipalities (with a projected total of 97,006) for 1979, these requirements are expected to increase to 106,494 for the districts, and 4,591 in the municipalities (with a projected total of 111,085) primary school teachers by 1983. To ensure the successful fulfilment of these development programmes, while the government undertook to increase its primary education recurrent expenditure from K£58,729,000 in 1978/79 to K£78,040,000 in 1982/83, its development budget contribution to primary school education will increase from K£148,000 in 1978/79 to K£1,080,000 in 1982/83 (ibid.: 156).

IV.2.2 The Secondary (Academic and Vocational) Education Level (see Republic of Kenya, 1973: 153-154; 1976a: 62-72; 1979a: 157-159):

This element of formal education starts at the chronological age of about 13 years and is divided into two major stages (see Figure IV.11, pages 231, 232). The lower secondary education course, whose successful completion leads to the award of the KCE, is covered in four years (Forms I-IV). In the "Harambee" secondary education sector, however, the students are required to take a terminal public examination, the KJSE, at the end of the Form II course. The more successful ones continue with their academic work while the others either go on to the vocational training institutes and technical schools or join the employment sector. The second tier of secondary education consists of Forms V and VI courses, whose successful completion leads to the award of the KACE (the equivalent of GCE-Advanced Level), and a series of secondary technical courses.

The current emphasis in secondary education is on the teaching of relevant practical skills, among other subjects, to facilitate direct employment, self-employment and employment in the informal urban and rural sectors. More specifically, the government set itself the following four objectives to achieve by the end of 1983, in addition to those others noted earlier:

2.2.a. to allow a further modest expansion so as to correct the imbalances existing between the districts and between boys and girls through more efficient utilisation of the existing resources, "judicious curriculum offerings", increasing class sizes to their full capacity and encouraging and supporting the "Harambee" Package Programme started during the Development Plan period;

2.2.b. to integrate education with rural socio-economic development through the diversification of the curriculum, especially by giving agricultural sciences and other practical subjects increased emphasis;

2.2.c. to promote personal qualities of creativity and innovativeness amongst students so that they can create their own income-earning opportunities, for example, through journalism and creative writing;

2.2.d. to promote a sense of ethical values and social obligation so as to uphold the values of traditional African society while preparing for the challenges of modern society; and, finally,

2.2.e. to establish programmes of out-of-school education through extra-mural and correspondence studies, and by radio and television for those not selected for secondary or post-secondary education (Republic of Kenya, 1979a: 157).

As noted earlier, Kenya's secondary education is expected to experience some modest expansion between 1979 and 1983. For example, while the total government-aided secondary school enrolments for Forms I-IV are expected to increase from 124,640 in 1979 to 137,080 in 1983, those for the Sixth Form (V and VI: Science and Arts) will rise from 13,819 in 1979 to 16,068 in 1983. Whereas the ratio of arts to science classes will be 1:2 by 1983, the average class size for science will stabilise at the current figures of 28 and for arts at 32 students. To facilitate the successful achievement of the targets outlined above, the government committed itself to increasing its total recurrent secondary education expenditure from K£12,963,000 in 1978/79 to K£15,903,000 in 1982/83 and its total development budget for secondary education from K£1,205,000 in 1978/79 to K£1,297,000 to 1982/83 (ibid.: 158).

With regard to secondary technical/vocational education, the government is currently upgrading facilities and equipment in the existing technical schools and completing the construction of two new technical schools at Kitale and Shanzu. In addition, it decided that by 1983, 15 government-aided secondary schools will be offering full technical education programmes, including the total change-over, which was achieved in 1979, from the Cambridge technical examinations to Basic Engineering or Basic Building trade courses offered at Nakuru, Mombasa and Nairobi Technical High Schools. While the Kitale school will offer an engineering course with emphasis on agricultural mechanics, the Shanzu school will offer general engineering courses. The number of classes and enrolments in secondary technical education are projected to increase, respectively, from 196 and 7,056 in 1979 to 234 and 8,424 in 1983. Correspondingly, the government recurrent expenditure for this sector of education will rise, respectively, from K£1,120,000 in 1978/79 to K£1,442,000 in 1982/83

and its development budget is expected to increase from K£910,000 to K£3,354,000. Thika Technical School will be the pilot project centre in which holiday courses in trade skills will be offered to technicians working in the informal sector (ibid.: 159).

Polytechnic education will also experience increased expansion during the Fourth Development Plan period. In addition to strengthening the existing courses and to introducing new ones in industrial and commercial areas at the Kenya Polytechnic, Nairobi, and the Mombasa Polytechnic, the government is currently completing the building of a third college, which will be known as the Jomo Kenyatta College of Agriculture and Technology, and which will be located in Kiambu District, Central Province (between Nairobi and Thika). Measures are also being taken to establish production workshops in collaboration with the Faculty of Engineering at UON to provide work experience for the non-sponsored students. Furthermore, more bursaries will be provided to private students by the government. Whilst the total student enrolments in the polytechnic colleges are expected to rise from 3,282 in 1978/79 to 3,995 in 1982/83, the total number of lecturers will correspondingly rise from 309 to 379. At the same time, the government total recurrent expenditure will increase from K£1,445,000 for 1978/79 to K£2,237,000 in 1982/83 and its total development budget will be decreased from K£1,455,000 to K£1,062,000. It is hoped that these broad measures will enable the country to meet its increasing manpower needs with regard to incorporating technological changes into the economy (ibid.: 162).

The developments within the "Harambee" Institutes of Technology were partly discussed earlier in this chapter. At this juncture, it is necessary to note that these 15 institutes will all be offering craft and technical courses in mechanical engineering, electrical engineering, building trades, agricultural engineering, food processing, irrigation and business studies. Whereas the final examinations will be based on syllabi approved by the Ministries of Basic, and Higher, Education, and of Labour, the Certificates will be signed by the Director(s) of Education. The "Harambee" spirit will be encouraged so that the institutes continue to function as financially self-supporting institutions. However, the Inspectorate and Education Media Services will be required to increase their support services to the institute to enable them to

function more efficiently and effectively than at present (ibid.: 160-163).

IV.2.3 The Tertiary and Higher Education Sector

This sector consists of all the institutions of higher academic and professional education and training, including the teacher training, agricultural education and university education institutions. For the purposes of this investigation, this discussion will be confined to primary and secondary teacher education and to the university education sectors for which the results of this study may have some specific implications. As shown in Figure IV.11, pages 231, 232, tertiary and higher education in Kenya starts at the chronological age of about 17 years, that is at the fifteenth year of formal education.

2.3.a. The Primary Teacher Education Sector:

The current aims in primary teacher education are to improve teaching standards, to ensure that the role of the teacher is gradually changed from one of mere classroom instructor to that of a more adaptable educator and to improve the quality of the professional teacher educators in primary teachers' colleges through in-service education and training programmes or new courses mounted at KUC. Primary school teachers will attend intensified in-service and re-training courses to equip them with the necessary skills for handling the revised school curriculum (ibid.: 163).

With the current student/tutor ratio of 15:1, whilst enrolments in primary teacher training colleges are projected to rise from 8,700 in 1979 to a constant 10,300 students in 1981, the requirement for tutors is expected to rise from 580 to a constant figure of 687 by 1981. These increases throughout the 17 primary teachers' colleges will help to speed up the process of phasing out all the existing untrained teachers in the primary schools. In addition, measures will be taken to train teachers of agricultural, technical and business subjects to make the curricula more practical in orientation and diversified in subject content (ibid.: 1963).

2.3.b. The Secondary Teacher Education Sector:

Kenya's secondary teachers are educated and professionally trained in three institutions, namely, at KUC (which will be discussed later),

KSTC and KTTC, which are all found in Nairobi[14]. The government's objectives in secondary teacher education and training are:

3.b.i. to produce sufficient non-specialist and specialist teachers to allow the secondary-aided programme to work effectively and efficiently;

b.ii. to produce enough graduate and non-graduate, non-specialist and specialist teachers to staff the "Harambee" Package Programme; and

b.iii. to reduce to a minimum the country's dependence on non-citizen teachers (ibid.: 163-165).

The KSTC will be extended to accommodate 25 per cent more students by 1983 and it is expected to continue playing an important role in the education and training of lower secondary science teachers. The new KTTC, established to meet a variety of needs in technical and business education, will help to increase the number and level of technically skilled Kenyan personnel for employment in all sectors of the economy, including teaching, technical and business education courses in Kenya's secondary schools. The total enrolments for KSTC will rise from 540 in 1979 to 675 students by 1983, and for KTTC, the increase will be from 470 in 1979 to a constant figure of 550 by the end of 1981. Thus, whereas the total enrolment for both of these colleges was 1,010 students in 1979, this figure will rise to 1,225 students by 1983 (ibid.: 164).

To cater for this expanding teacher education programme, the government undertook to increase its financial commitment to the colleges' maintenance and development. Thus, of the total recurrent expenditure for 1978/79 of K£3,288,000, the primary teachers' colleges (PTCs) received about K£2,427,000, KSTC took K£447,000 and KTTC received about K£414,000. These figures are expected to rise, respectively, to K£4,707,000, of which K£3,458,000 will go to PTCs, K£603,000 to KSTC and K£646,000 to KTTC by 1982/83. In terms of the development budget, the government's contribution, however, is expected to drop because some of these colleges will have reached their ceiling capacity for development. Thus, whilst out of a total development budget of K£1,212,000 in 1978/79, PTCs received K£583,000 and KTTC received K£629,000, KSTC did not receive any money. By 1982/83, the total development budget is expected to have dropped to K£601,000, of which K£511,000 will go to PTCs and

K£90,000 to KSTC while KTTC will not be receiving any development funds then (ibid.: 163-165).

2.3.c. The University Education Sector:

As shown in Figure IV.11, pages 231, 232, university education in Kenya generally starts at the chronological age of 19 years, or during the fifteenth year of formal education. After the dissolution of the former University of East Africa, of which the University of Nairobi[15], was a constituent university college, and with the enactment of the University Act in 1970, the University of Nairobi (UON) was instituted formally as the national university, with Kenyatta University College (KUC), as a constituent college. The UON offers a wide range of undergraduate and post-graduate degree and diploma courses, including agriculture, the arts and social sciences, commercial and business management science, engineering science, journalism, law, medicine and the veterinary sciences. KUC, on the other hand, offers education-oriented academic and professional degree and diploma courses at the undergraduate and post-graduate levels. With the final transfer of the Faculty of Education from the UON main campus to the KUC campus, where it was merged with the existing Faculty of Educational Studies, KUC became formally the country's sole and self contained university institution of professional teacher education and training. Although all types of educational personnel are prepared professionally at KUC, emphasis is particularly placed on the education and training of secondary school teachers and teacher educators for the PTCs throughout Kenya through the pre-service Bachelor of Education degree, the one-year Post Graduate Diploma (Certificate) in Education and the in-service education/re-training (short-term or two-years' diploma) programmes.

The university sector in Kenya is generally expected to produce trained man-power with the motivation, skills and knowledge necessary to enhance the country's technological progress. According to the Fourth Development Plan (Republic of Kenya, 1979a: 165-167), 'the University will:

> i. Address itself to the problem of man-power shortages to be indicated by the proposed Man-power Survey through its undergraduate and graduate programmes while continuing to provide a home for basic research combined with teaching;

ii. Engage in research relevant to the nation's needs. Some areas indicated .... are: (a) research on the nature and causes of social changes and the policies appropriate for guiding it in constructive directions; (b) research on identification and adaptation of appropriate technologies in the modern and informal sectors; and (c) research on the impact of development on the environment and the means of sound ecological management of the nation's resources;

iii. Establish and operate a University Students Service Scheme whose aim will be to impart sound knowledge of the development problems in rural Kenya (ibid.: 165).

Amongst other additional objectives for the development of the university sector are: the proposed introduction of an external degree programme to cater for those interested in but unable to undergo a conventional university education; the introduction of scholarly studies of Kiswahili to facilitate the production of adequate literature and other educational resources for the teaching of Kiswahili in schools; the establishment of an Institute of Kiswahili for research-work; the training of Kenyan university lecturers and other specialised personnel through post-graduate programmes which are planned according to the nation's needs; the expansion of the facilities at the KUC campus to cater for the increased number of students there; and the establishment of a second university in Kenya, which will be suitably located to complement the work of the UON. The proposed university will concentrate its efforts on some of the following fields of study, which are currently neglected:

a. management and development problems of arid and coastal zones;
b. marine science and engineering;
c. chemical science and engineering;
d. water engineering; and
e. mining engineering.

Already, however, the government is working on plans to expand the Egerton National Agricultural College, Njoro.

As noted earlier, the Kenya Government pays the academic costs of all university students. However, through the University Students' Loan Scheme, which was established during 1974/75, the students are given money on loan to enable them to meet their lodging and other personal

welfare expenses. This money, however, has to be repaid to the Government of Kenya on assumption of post-university education careers. This measure is officially viewed as a way of ensuring that students make some contribution towards their educational preparation for future service to the nation. Hence, the government's decision to continue operating the Loan Scheme throughout the current Plan Period.

In line with the rest of the expanding sectors of Kenya's formal education system, enrolments in the university sector are generally expected to increase. Thus, whilst in 1978/79 the UON and KUC had 4,800 and 1,450 students, by 1982/83, these enrolments will rise to 5,900 and 2,550 students, respectively. In other words, total university enrolments are expected to increase gradually from 6,250 in 1978/79 to 8,450 students in 1982/83, respectively. Every effort is being made to ensure that opportunities for university education are fairly and evenly distributed to female and male students who have the required entry qualifications from all the corners of the country regardless of their ethnic/racial and denominational backgrounds.

To cater for the proposed expansion within the university education sector, the Kenya government will be increasing its annual recurrent expenditure from K£10,917,000 in 1978/79 to K£15,771,000 by 1982/83, including grants and loans for Kenyan students in foreign universities. The annual development budget will rise from K£440,000 in 1978/79 to K£2,659,000 in 1982/83.

To conclude this discussion of Kenya's system of formal education, it is necessary to draw the reader's attention to the fact that, as a developing nation, Kenya is actively expanding and improving, inter alia, her education service, especially the formal education sector. Inevitably, such development-oriented programmes place heavy financial demands on both the national exchequer and the private family income. Fortunately for Kenya, while the government continues to commit as much of its national annual recurrent expenditure and development budget to the development and improvement of education at various levels, the wider society also makes its substantial voluntary contribution through an ever-expanding and growing nation-wide "Harambee" educational development programme. Furthermore, the students themselves are indirectly

contributing towards their higher education by undertaking to repay the money, which they are loaned while at university, when they start formal employment. With specific reference to this investigation, it is noteworthy that the field interviews and tests, which were carried out in several rural and urban schools in three of the eight provinces of Kenya, would have been difficult, if not practically impossible, to complete successfully if the schools involved did not have the necessary basic human and physical resources. The reasonably ample supply of these resources is testimony to the success of the efforts being made to raise general standards of living through the medium of formal educational development, as diagrammatically outlined in Figure IV.11, pages 231, 232. Against this background, therefore, the next section will focus on the description of the present research methodology, sample characteristics and sampling procedures.

IV.3 Present Research Methodology

IV.3.1 Design of the Study

As discussed at length in Chapter II.5, the present research was designed generally to contribute towards attempts being made to acquire functional knowledge about Kenyan African children's cognitive and logical development through an empirical investigation in the subject fields of Piagetian psychology, geography and geographical education in Kenya. More specifically, the study was undertaken to investigate the development (in terms of processes and rates) of territorial decentration in Kenyan African children, with particular reference to the study of Piaget's theory of spatial stages in relation to the school geography curriculum in Kenya. In addition, this study is expected to contribute towards an understanding of the relative significance of several variable factors in influencing the development of the concept of territorial decentration; to attempt a comparison of its results with the findings of related previous studies so as to determine, as far as possible, the universality and generalisability of the theories and tests applied in those investigations; and to identify, state and discuss some of the implications of its major results and findings for the processes of planning, implementation, evaluation and renewal of the curricula in geographical education both at school and at higher levels

in Kenya, and for further research.

According to the survey carried out in Chapter II.6, pages 102-111, and on account of its various methodological features, which will be described later in greater detail, the present research is cross-cultural and replicational in nature. It also possesses characteristics which are, in varying degrees, typical of the cross-sectional, survey or descriptive, experimental, observational, clinical or case study, and/or the correlational categories of educational research, as outlined in the section cited above.

IV.3.2 Present Research Sample Characteristics and Sampling Procedures

3.2.a. Size of the Present Research Sample:

A detailed review of pertinent literature in Chapter II.4, pages 69 - 101, revealed that the number of subjects involved in the related previous studies tended to vary between 60 and 240. In the present investigation, and as shown in Table IV.2, page 233, a total of 270 (135 boys and 135 girls) Kenyan African school pupils, aged between 11 and 20 years, were selected in the manner described below to participate in this research from each of the alternate grades of Standard 6(1), and Forms 1(2), and 3(3) of the 7 primary and secondary research schools. As shown in Table IV.3, page 234, this sample was drawn from a total research population of 3,884 school children, of whom 2,006 (51.65 per cent) were boys and 1,878 (48.35 per cent) were girls. This research population was comprised of the total enrolments for 1980 in the above-named 7 schools involved in this research (see Tables IV.3 and IV.4, pages 234 and 235, respectively. In comparative terms, therefore, whereas Stoltman's (1971, 1976) sample of 204 American subjects constituted 8.9 per cent of the research population of 2,292 school children, the present sample accounted for 7 per cent of the total research population (see Table IV.4, page 235).

3.2.b. Some Theoretical Considerations of the Problem of Selecting Research Subjects:

The problem of deciding upon the most appropriate and effective method(s) of selecting research samples at random (random selection) has been of great concern to investigators undertaking experimental studies which are based on interviewing and testing samples of certain research

populations (see, for example, Sandford, 1970: 94-97). Ideally, such randomly selected samples are expected to represent those specific research populations from whom they are selected, and about which the results and findings of the investigation(s) concerned can be generalised with reasonable degrees of confidence and accuracy. Thus, the problem of "random sampling" has attracted the attention of many authors of literary works on research methods and techniques. See, for instance, Bennett (1973: 33-73), Borg and Gall (1979: 176-205), Burroughs (1975: 55-66), Butcher (1966), Entwistle and Nisbet (1972: 29-42), Evans (1978: 44-45), Fisher (1951), Fox (1969), Kerlinger (1973: 117-132), Nisbet and Entwistle (1970: 24-31), Selkirk (1979, especially pages 11-18), Stacey (1969: 88-97), and Travers (1978: 267-296). According to Kerlinger (1973: 118), "random sampling" is 'that method of drawing a portion (sample) of a population or universe so that all possible samples of fixed size n have the same probability of being selected' (see also Feller, 1957: 29).

As Sandford (1970) discovered, each of the various methods of random selection of the research sample has its advantages and demerits, as the following brief outline shows. Firstly, a "true random sample", in which each individual in the research population would have an equal chance of being selected, and in which the selection of one individual would in no way be linked to the selection of another individual, is often impracticable. It also has the disadvantage of rendering it difficult to control the experimental testing conditions (Sandford, 1970: 94). A second method is called "probability or systematic sampling". It involves the random choice of the first sample element from numbers 1 through to k, and the subsequent selection of other elements at every kth interval or 100th student. Thus, for example, if the student randomly selected from a list of 1 through 10 students is number 6, then the subsequent students to be selected are 16, 26, 36, 46, 56, and so on (Kerlinger, op. cit.: 130). However, as Nisbet and Entwistle, op. cit.: 27, warned, 'it is sometimes difficult to be quite sure that a factor (the kth interval or 100th student, or pupils whose names begin with letter S) is totally irrelevant'. Hence, the limitation of using systematic sampling as a method of random sampling.

A third method is known as "true stratification". This technique involves the division of the research population into categories or strata, with an independent and random selection of sub-samples taken from each stratum, and it has two main advantages. First, it often results in a more precise estimate of population variance than that yielded by random samples. This is so because the sampling error of the mean, or a proportion estimated from the stratified sample, is nearly always smaller than the standard error, which is synonymous to standard deviation ($\sigma/\sqrt{n}$ (see Snedecor and Cochran, 1967: 50), in a simple random sample, especially when the bases of the stratification are clearly related to the variable under discussion. The sampling error of the mean, which can be defined as a measure of the closeness of an estimate of population statistic (mean μ) to its true value, not only depends on how variable the population is, but also on the size of the sample. A second advantage of true stratification is that the strata are ready for analysis if required (see Bennett, 1973: 42-43; Cochran, 1963: 87-153 and Sandford, ibid.: 94-95).

Another method of random selection of the research sample is known as "cluster sampling". This method involves the random selection of subjects from such "natural" groups as schools or classes/grades of children. Since subjects are only selected at random from particular groups or clusters, lists of the whole research population may not always be required for use. However, in using this method, it is important to note that its efficiency depends on the number and size of the clusters involved. Thus, on the one hand, a large number of small groups could ensure the attainment of most of the characteristics of simple random sampling. On the other hand, taking one such large group as a school at random, though more convenient, may yield an unsatisfactory sample due to an increased sampling error. This error tends to be greatest when the clusters are large and homogeneous with respect to the variable under investigation. Homogeneous clusters are groups of whom the members are very similar with regard to the characteristics under consideration (Bennett, op. cit.: 44-45). As will be noted later, in the present study, the school grades/classes, as opposed to schools, were used as the larger number of smaller clusters so as to ensure that the sample selected from the 11 grades of the 7 schools involved in the research in the 3 provinces of Kenya was as representative of the research

population as was practically possible.

A fifth method, which avoids the often impossible rigours of random sampling but ensures the necessary wider representation associated with cluster sampling, is called "stage sampling". There are two main sub-types of stage sampling, namely, "two-stage" and "multi-stage" sampling. In the first instance, while in random sampling 2 or 3 pupils are selected from one school, and 10 or 20 others from another school, and so on, in "two-stage sampling", a sample of schools is taken, and within the selected schools, a sample of pupils is selected. For larger and national studies, "multi-stage sampling", which involves the random selection of samples of education areas (district, provincial or local education authorities (LEAs)), the selection of a random sample of schools from within each education area, of a random sample of classes from within selected schools, and finally, of random selection of pupils from within the various elements mentioned above. As long as each individual unit in each stage has an equal chance of being selected for inclusion (that is, there is persistent maintenance of the principle of random selection at each stage) the "multi-stage" sampling technique yields a representative sample which may permit the maximum exploitation in the analysis phase, especially as it permits accurate estimates of the sampling error.

A sixth type of sample selection, which is also a crude but inexpensive non-probability method of sampling similar to a stratified sample, is called "quota sampling", or "judgment sampling". In this "quota sampling", knowledge of strata of the population (for example, sex, race, age and SES) is used to select sample members that are representative, "typical", and suitable for certain research purposes. For example, quotas of ten interviews, with a predetermined proportion in certain age-ranges, or from certain strata of descriptive variables, are given to each interviewer for filling in. Thus, when all the results are put together, the total group of subjects interviewed and/or tested are expected to be a representative model of the research population in the distribution according to the strata of descriptive variables used initially (see Kerlinger, ibid.: 129, and Nisbet and Entwistle, op. cit.: 29).

Lastly, there are two other commonly-used forms of non-probability sampling, namely, "purposive" and "accidental" sampling. According to Kerlinger, ibid.: 129, "purposive sampling" is 'characterised by the use of judgment and a deliberate effort to obtain representative samples by including presumably typical areas or groups in the sample'. In "accidental sampling", which is the weakest form of sampling but one that is used most frequently, one takes and uses such available samples as classes/grades of students in their entirety to collect one's research data. Hence, Kerlinger's caution that:

> Avoid "accidental samples" unless you can get no other samples - random samples are usually expensive and, in general, hard to come by - and, if you do use them, use extreme circumspection in analysis and interpretation of data. (Ibid.: 129).

The present investigator considered most of the methodological issues discussed above with respect to the problem of selecting research samples. However, due to the constraints which were discussed in Chapter II.7, pages 111-116, it was not possible to adopt, in its pure form and on its own, any particular one of the above-described methods for use in the present research. An attempt follows below to describe the specific practical considerations (factors or conditions and procedures) of selecting the sample that participated in this study. In selecting the present sample, a number of personal and social variables of the school pupils in the research population were taken into account. The main personal variables thus considered were the pupils' age, sex, and grade/class or year of schooling. Pupils who were known to have visual or auditory handicaps or who were unable to stand erect were excluded from the sample. However, it was not possible to control the selection procedure with respect to whether the pupils were left- or right-handed, or ambidextrous. Similarly, no proven scientific test was administered to the children in the present research population, as Eliot (1966: 45-49) did in his study, to determine the children's relative hand and eye dominance. Nevertheless, to ensure that the subjects eventually selected did not experience any problems associated with that dominance, the present writer asked each subject, prior to administering the task, questions about the variables under consideration. In fact, as far as this investigator was able to observe, none

of the 270 subjects experienced any problems of handedness or eye dominance.

As will be described in Chapter V, a personal variable which was not considered in selecting subjects for this research was their academic performance in the school grades/classes, that is, whether a pupil was above-average, average, or below-average, in academic achievement. Thus, despite the enthusiasm displayed by the school headteachers and teachers to persuade the present investigator to select children a and y, who are supposed to be better in class performance than children b and z, this writer resisted all these tempting efforts, insisting that the research had specifically nothing to do with a child's individual performance as measured in terms of a school academic examination. However, and as will be described in Chapter V, all the participating 270 subjects were required to undertake, inter alia, the Class Inclusion Task/Test (CIT). This task was purposely included in this research to help determine, in operational terms, the participating subjects' relative levels of intellectual aptitude (competence) and ability (performance).

A number of socio-cultural and economic variables of the background of the children in the present research population were considered during the process of selecting the research sample. These socio-cultural and economic characteristics included the parents' and/or guardians' level of formal and/or non-formal education, occupation(s), socio-economic status (SES), place of birth, place/province/district/region of permanent residence, main mode of transport (whether there is a bi-cycle, motor-cycle, car, truck or lorry for family's use), and lastly, tribe. The last variable was specifically included to help ensure that only those subjects whose parents belong to the respective major tribal groups, which are permanently resident in the research provinces/regions, were selected. Thus, it is significant to note that the aim here was not to show that a particular tribal group was better or more favoured than another in terms of performance on the criterion instruments used in this research.

3.2.b.i. The Age Factor in the Selection of the Sample:

As discussed briefly in Chapter I.5, page 41, some earlier investigators, particularly those working in the field of cross-cultural

psychology, have encountered problems associated with the precise determination of the true chronological age(s) of their research subjects in the absence of reliably accurate age records (see, for instance, Igaga (1974: 131-134), Kamara and Easley (1977: 30-33), and Kelly, 1977: 176-177). With specific reference to the East African context, Igaga (1974), who discussed, inter alia, the problem at length, with respect to Uganda, concluded that:

> .... the age of the children may be determined by numerous dictating conditions. A parent may give an overage to enable his child to get into school because he feels that his child is mentally ready for school although chronologically under-age; if he gave the right chronological age, the school would not consider his child. The parent may give a false younger age for his child because he feels his child may be rushed through the education system if he was found to be "too old", and would not be given a chance to repeat a class, should the need arise.
>
> .... Therefore, in many cases, children (in East Africa) (may) possess two "ages", namely, the "school age" and the "actual age". It must be emphasised that there are very many children whose actual age is the same as their school age .... (page 131).

Yet, there are other workers who have not experienced such problems. For example, Dasen (1970, 1974, 1977) reported that he 'did not encounter similar difficulties in his research with the Australian Aborigines and Canadian Eskimos', adding that 'the few children who did not have accurate birth records were easily removed before the sampling' (Dasen, 1977c: 13).

Some of the investigators cited above have suggested a number of ways in which the age of the subjects may be determined in the absence of official accurate records. These methods include: "guesstimating" the age using available information based on some records, and on the "eruption of teeth" in Papua New Guinea (Gates, 1964, and Kelly, op. cit.); the observation of the exact stage of tooth eruption at each position in the mouth (Kirk, 1975, in Ghana); "farm enumeration" amongst populations practising agriculture and shifting cultivation, and "sibling comparison" (Kamara and Easley, op. cit.). Since each one of these methods has advantages and certain limitations, and since the conditions operating in various experimental situations are diverse, investigators are expected to adopt those methods that are most

appropriate to their practical working environment(s).

With specific reference to the present study, it is noteworthy that this investigator did not experience any insurmountable difficulties associated with the accurate determination of the children's age. This is so because the Kenya Government operates a strict and efficient system of registering all births and deaths. Thus, in most cases, the official school records were reliably kept, especially as each parent is required to produce a birth certificate before his/her child can be enrolled in a given school. However, in cases where the present investigator discovered some anomalies, a three-pronged strategy, which is described in greater detail in Section IV.3.b.vi, pages 213- 214, was employed to obtain the necessary accurate information.

As already noted, the age of the subjects in the sample varied from 11 to 20 years (see Table IV.2, page 233), and that the overall mean age for the total sample was 14.64 years (see Table IV.5, page 236). Another feature that is clearly illustrated by Table IV.5 is that the "remote" rural region of Narok (3) produced the highest mean ages for boys and girls throughout the three research grades, and correspondingly, it recorded the highest overall mean regional age of 16.73 years[17]. By comparison, however, the urban metropolitan region of Nairobi (1) recorded the lowest mean ages for all the subjects in each of the grades, with an overall regional mean of 12.85 years. The mean ages for boys and girls in each of the three research grades, and the overall regional mean age of 14.34 put the Kiambu peri-urban/semi-rural sub-sample (2) in an intermediate position between sub-samples 1 and 3. The conclusion to be drawn from this is that the age of the subjects interviewed increases with increasing distance from the urban region, where the majority of parents seem to be taking their children to start formal schooling at the officially prescribed age of 5 years, and where the demands placed on the children to perform some domestic socio-economic duties are not as great as they are in the semi-rural and remote rural traditional society areas.

3.2.b.ii. Selection of Research Schools:

As shown in Tables IV.3, IV.4, and IV.6, pages 234, 235, and 237, respectively, 7 schools were selected to participate in this investigation.

Five (5) main factors controlled their selection. Firstly, to ensure some uniformity in the standards of educational practice, and in the provision and availability of the essential or basic human and physical teaching/learning resources, upon which the effective and efficient functioning of educational institutions mainly depends, only government-aided-and/or-recognised primary and secondary schools were considered appropriate to form the research catchment for this study's sample. Thus, all the schools established through private and/or commercial enterprise, including the "Harambee" schools, which were not recipients of any direct assistance from the Government of Kenya by the time this research was carried out (January-July, 1980), were excluded from the general lists from which the participating research schools were finally selected.

Secondly, an attempt was made to select an equal number of primary and secondary schools from each of the three different research regions. However, since it was not possible to find an appropriate co-educational secondary school in the Nairobi urban region (1), girls were selected from the State House Road Girls' High School, and the boys were drawn from Strathmore College Secondary School. Hence, the resultant greater number of 4 secondary schools used in the study. As shown in Figures IV.6, IV.11, IV.12, pages 226, 231, 232 and 238, 239, and in Tables IV.3, IV.4, and IV.6, pages 234, 235 and 237, respectively which illustrate their type, locational, enrolment and associated characteristics diagrammatically, three (3) primary, and four (4) secondary, schools were selected in the manner described below to participate in this research.

Thirdly, and with the exception of Strathmore College Secondary School, all the schools selected were either low- or medium-cost government-aided national institutions. These national schools draw their students from all parental socio-economic background levels. Even in Strathmore College Secondary School, in which the fees charged are slightly higher than they are in the totally government-maintained schools, it was possible to find large numbers of children whose parents belong to each of the different income brackets. Thus, the present research sample seems to be more representative of the entire research school population within the three research regions than would have been the

case had the present investigator exclusively selected only high-cost or low-cost schools to participate in this study.

Fourthly, a comprehensive list of all the schools which satisfied all the basic requirements for participating in this study was drawn up. On the basis of information provided by some KUC's Faculty of Education lecturers, who had experience of school practice teaching supervision in most of Kenya's schools, the present investigator short-listed, from the comprehensive list, 4 primary and 4 secondary schools in each of the 3 research regions.

Having obtained the Research Permit from the Office of the President (see Appendix II.5, pages 443-454), this writer then visited head-teachers of each of the above-named short-listed schools. These informal visits fulfilled two purposes. First, the present investigator wanted to determine the personal willingness of the school authorities to assist in the effective implementation of this research. Second, it was necessary to ascertain whether the schools to be finally selected had the basic resources required for the successful administration of the present research instruments to the sample subjects. Wherever possible, however, preference in the final selection was given to any short-listed schools which had participated in any one of the previous research projects undertaken through the auspices of the Bureau of Educational Research (BER), KUC, which was formerly known as the Child Development Research Centre of the University of Nairobi. This was so because it was assumed that since such schools would be more familiar with research procedures than their counterparts, lengthy procedural explanations would be unnecessary, thereby allowing more time to be spent on the actual administration of the research instruments. Three (3) schools fell in this category, namely:

a. State House Girls' High School, Nairobi;
b. Kabuku Primary School, Limuru Division, Kiambu District; and,
c. St. Michael's Primary School, Makadara, Nairobi.

These schools were, therefore, automatically selected to participate in this research. Others were selected on the basis of the other factors outlined in the preceding paragraphs and below.

Having established a friendly working relationship with the head-teachers and some of the teachers of the selected schools, and as required by official policy of conducting research in Kenya, this writer obtained letters of permission to undertake research in the schools from the respective Provincial and/or District Education Officers. These letters appear as Appendices II.5.G-I, pages 450-452. In addition, these officers undertook to give the present researcher such assistance as he would require during the course of his stay in their respective areas of authority. Then, the investigator sent a formal letter to all head-teachers of the 7 participating schools to: outline the purpose of the research, request the relevant background information about the schools and indicate the facilities which were required for the administration of the research instruments to the subjects. A copy of these letters appears in this thesis as Appendix II.5.J, pages 453-454.

Fifthly, the factors of easy accessibility from KUC, Nairobi, to, and the distances between, the potential research schools were taken into account to ensure some reduction in the costs of transport and to economise on the amount of time the investigator had to spend on travelling. Therefore, for example, such schools as Ololulunga Primary and Kilgoris Secondary in Narok District, Rift Valley Province, would have been ideal for use in this research because of their locations further away from the district administrative centre of Narok Town. Nevertheless, the present investigator decided to use Il Masharian Primary and Narok High Schools for two main reasons. Firstly, despite their location within the boundary of Narok Township, the two latter schools draw their school populations from a dominantly rural environment which is as remote from the Nairobi urban region (140 kms) as the former two schools. Secondly, while the distance between Il Masharian Primary and Narok High Schools is only $2\frac{3}{4}$ kms, the two schools are within easy access from the major roads. However, one exception to this rule was Kabuku Primary School, which is situated about 30 kms to the north-west of Nairobi, in the peri-urban/semi-rural region (2), in Ngecha Location, Limuru Division, Kiambu District, Central Province, respectively. As already noted, Kabuku Primary School was preferred to any others located near Kiambu High School in Kiambaa Division, Kiambu District, because it (Kabuku) had participated in several earlier educational research projects. In addition, while the head-teacher, her staff and pupils were

enthusiastic about taking part in this research, the school also has adequate educational resources, and it is within easy access from the main tarmac road from Nairobi to Limuru Township and beyond. Kiambu High School, which is a co-educational boarding school, was also selected because, inter alia, it is within convenient travelling distance of about 18 kms from the BER at the KUC campus, and it draws its students dominantly from the wet and forested peri-urban/semi-rural environment (Region 2) of the Central Province.

3.2.b.iii Selection of Research Grades/Classes:

To allow for an examination of relative influence of the grade or year of schooling in their development of territorial decentration, as was outlined in Chapter III.4, pages 138-139, the subjects for this research were selected from each of the alternate grades/classes of Primary Standard 6 (sixth year of primary school), and Secondary Forms 1 and 3 to participate in this investigation. Two major factors controlled this selection. Firstly, it was assumed that the students in, and teachers of the school public examination grades/classes (Standard 7 and Form IV) would be so busy preparing for the public examinations that they would not have the time and enthusiasm which are necessary for participating effectively in this research. It is also important to note that in Kenya, as elsewhere in East Africa, public examinations are taken seriously by the candidates, teachers and parents. This is so because success or failure at these examinations determines the future careers of those concerned, and indeed, all the potential employers base their selection of employees on examination results. For this reason, Standard 7 and Form 4 students, who were preparing for their CPE and KCE examinations, respectively, could not take part in this research.

Secondly, since the interviews and tests were to be conducted in English, the official medium of formal educational instruction, it was decided to select subjects from Primary Standard 6 (research grade 1) from the primary school level on the assumption that by the time they reach this school level, pupils must have acquired some reasonable functional knowledge of English, and would thus have but little difficulty in understanding the research instructions and short interview schedules. Therefore, and although it would have been more profitable

in comparing the results of this study with those of earlier related investigations, it was not possible on this occasion to select research subjects from grades lower than Standard 6 of the primary school.

As shown in Table IV.6, page 237, the total enrolment in all the research grades (1, 2 and 3) in 1980 was 1075, of whom 519 were boys and 556 were girls. Since a total of 270 subjects was selected, this research sample thus accounted for 25.1 per cent of the total enrolment in the 11 research grades of the 7 schools. The sub-total enrolment for St. Michael's Primary School is high because each grade or class or school year had 3 mixed-ability streams (A, B and C). On the other hand, Kabuku and Il Masharian operate a double mixed-ability streaming system. Lastly, it should be noted that the total enrolment figure for girls of 556 is higher than that of the boys because whereas Narok High, Kiambu High and Strathmore College Secondary Schools have each 2 streams of mixed ability for each school year, State House Road Girls High School operates a three mixed-ability streaming system.

3.2.b.iv. Sex Ratio in the Research Sample:

To ensure an equal distribution of the subjects in the sample according to sex and to allow for an examination of the relative influence of differences in sex in the development of territorial decentration, as was explained in Chapter III.3, pages 134-137, 15 boys and 15 girls were randomly selected from each of the research grades described above. As Tables IV.2 and IV.6, pages 233 and 237, show, 135 boys (50 per cent) and 135 girls (50 per cent) were selected to constitute a total research sample of 270 subjects.

Within the Kenyan system of education, the average total enrolment in each grade or class stream is about 40 pupils. However, the Sixth Form grades tend to have lower total enrolments, as discussed earlier in this chapter. Given the above, therefore, it was not difficult for the present investigator to obtain the required number of subjects to form the present sample, whilst taking account of such other essential selection criteria as are outlined in this chapter.

3.2.b.v. The Role of the Factor of Physico-Eco-cultural Environmental and Residential Experience (PEERE) and Other Related Variables in the Selection of the Subjects:

As outlined in Chapter III, Sections 6, 7 and 8, pages 143-156, one of the purposes of the present research is to examine the relationship between, on the one hand, the factors of the PEERE, spatio-perceptual levels, and psychological differentiation styles, and the development of territorial decentration amongst Kenyan African children on the other. Thus, to allow for the testing of the hypotheses which were set up, namely, Hypotheses 6, 7 and 8, 90 subjects (45 boys and 45 girls) were randomly selected from each of the 3 research regions. This resulted in the total research sample of 270 subjects (135 boys and 135 girls) (see Figures IV.2, IV.10 and IV.12, pages 220, 221, 230 and 231, 232; and Tables IV.1 to IV.6.

As described elsewhere, particularly in Chapter III.6, pages 143-151, these research regions are:

1. the built-up urban environment of Nairobi City and Province;
2. the peri-urban/semi-rural, high plateau, sub-humid, and forested environment, which is densely populated by the traditionally rural sedentary agriculturalists and pastoralists, the Kikuyu; and, finally,
3. the remote rural and dominantly rolling open grass-land landscape, which is mainly inhabited by the traditionally rural semi-nomadic pastoralists called the Maasai.

Careful measures were taken to ensure that the subjects selected were those who genuinely possessed the environmental and residential experience(s) typical of the region(s) described above. As briefly discussed earlier, only those children, whose parents/guardians belong to the dominant indigenous African tribal or ethnic group of, and are permanently resident in, each of the three different research regions, were selected. Thus, as many Maasai and Kikuyu children as could be found in the research schools and grades in Narok and Kiambu Districts, respectively, were all included in the sample. The exception to this rule, however, was the Nairobi metropolitan region whose population is so cosmopolitan that it was very difficult to identify any single dominant indigenous tribal group from which the research sub-sample

for the region could be randomly drawn. In this case, and in those others where it was not possible to obtain the required number of "indigenous" subjects, the investigator selected students whose parents had settled permanently in the new region(s) in which they were not originally born. According to this writer's observation and enquiry, these "semi-indigenous" children showed evidence of having learnt the dominant local tribal language(s), and of full participation in the traditional cultural and socio-economic activities of the region(s) concerned.

Table IV.7, page 240, shows the regional proportion of the research sample and population in terms of numbers and percentages. According to the information shown in this table, in 1980, the urban region of Nairobi had the largest research population of 1,808, or 46.55 per cent, out of the overall total of 3,884 school children enrolled in the 7 research schools. The remote-rural region of Narok District, Rift Valley Province, had the second largest research population of 1,123, or 28.91 per cent. Finally, the Kiambu peri-urban/semi-rural region had the smallest research population of only 953, or 24.54 per cent, out of the entire research population of the 7 schools involved in this study.

3.2.b.vi. The Factor of the Socio-Economic Status of the Parents (SESP) in the Selection of the Sample

As was discussed in Chapter III.5, pages 139-143, one of the aspects upon which attention is focussed in this study is an examination of the role of SESP in the development of territorial decentration amongst Kenyan African children in the research sample. Thus, to allow for the testing of Hypothesis 5, all the subjects participating in this research were divided into the various SESP Categories, as shown in Table III.4, page 144. Just as with the rest of the background variables described in this chapter, the information upon which this categorisation was based was obtained in three main ways. Firstly, the investigator extracted all the relevant information about each of the participating subjects from the official school records. Secondly, a short background information questionnaire was administered to all the subjects in the sample prior to the testing phase. Finally, the investigator, formally but briefly interviewed each of the subjects in the

sample before administering the relevant research task. The main purpose of this three-stage approach was to ensure that the information collected about any of the subjects was a reasonably accurate profile of his/her background.

3.2.c. Stratification of the Background Variables of the Research Sample

On the basis of the foregoing outline, and to allow for the eventual testing of the research hypotheses stated in Chapter III, the background variables of the present research population were stratified in five (5) ways. As shown in Table IV.8, page 241, the background variables which formed the 5 strata were age, grade (or class level or year of schooling), sex, PEERE and SESP. For details about the constitution and methods of determining each of the variables listed above, the reader is referred to the relevant section(s) in this chapter which describe the relative importance of each of the factors in the process of selecting the present research sample.

IV.4 Summary

In this fourth chapter, attention was focussed, firstly, on describing the setting of present research in Kenya with particular reference to understanding the geographical and cross-cultural perspectives within which the experimental study took place. The various aspects discussed in this regard included, inter alia: the country's locational, areal, ecological, and socio-economic features; and the historical, organisational and developmental aspects of Kenya's education system. In outlining the main features of the education system, emphasis was placed on a consideration of the formal education sector since all the 270 subjects in the present research sample were randomly selected from institutions of formal education, namely, 3 primary and 4 secondary schools.

Secondly, the section on research methodology descriptively outlined the general design and organisation of this study, including a restatement of the experimental independent and dependent research variables. In addition to describing the characteristics of this research sample, a consideration of the theoretical and practical aspects of the sampling procedure was also undertaken.

It is, therefore, on the basis of these general background and experimental considerations that the fifth chapter sets out to describe the research instruments (tasks or tests) and materials which were used to operationalise the various criteria under present investigation; and the principles and procedures of selecting, administering and scoring those experimental tasks.

IV.5 Notes and References

1. The limited scope of this study hardly permits a detailed coverage of all the geographical and related aspects of Kenya. For such comprehensive information, reference may be made to some of the following works: Brown (1963), Bullock (1975), Burrows/IBRD (1975), Chambers (1974), Datoo (1975), de Blij (1968), Hake (1977), Hazlewood (1979 Hoyle (1973a), Hutton (1970), Kesby (1977), Morgan (1967, 1972), Morgan and Shaffer (1966), Odingo (1971), Ogendo (1967, 1971, 1972), Ogot (1974), Ojany and Ogendo (1973), Ominde (1968), Pratt and Gwynne (1977), Republic of Kenya (1970a, 1973, 1979a, 1979b), Russell (1962), Sec. St. Cols. (1955) and Soja (1968).

2. See Republic of Kenya (1973: 45).

3. See Press Section's General Information Leaflet No. 3 (June, 1981: 2), Kenya High Commission, London.

4. Detailed descriptions of each of these geographical regions can be found in Ojany and Ogendo (1973: 42-49, 56-72, 73-84, 85-98, 98-111); Republic of Kenya (1970a and 1973: 11-18).

5. Refer to Republic of Kenya (1979a: 42-51, 65-66).

6. For detailed accounts of the various aspects of the systems of formal education in Kenya and Great Britain, the reader can refer to, inter alia, the works listed below. For Kenya, these include the following: Central Bureau of Statistics (CBS) (1980), Court and Ghai (1974), Ergas and Chege (1974), Fine (1974), Hazlewood (1979), Heyer et al. (1971), Indire (1972, 1974, 1976), Indire and Sifuna (1974), International Year Book and Statesmen's Who's Who (1981: 273), Jones et al. (1961), Kamunge (1975), Kanji (1978), Kanu (1963/1969), Kay (1975), Keller (1967), KIE (1970), Kenyatta (1938), King (1972, 1975), Lavers (1960), MOE (1978), MOIB (September, 1980), Morgan (1971), Raju (1973), Republic of Kenya (1964a, 1971, 1972, 1973, 1976a, 1979a, 1979b), Sec. St. Cols. (1955), Sifuna (1975), Statesman's Year Book (1980/81) and Weeks (1967).

For Great Britain, the following works can be consulted: Committee of Council on Education (1847/48), Cope (1971), DES (1974, 1977a, 1977b, 1978, 1979), Secretary of State for the Colonies (1925), James Report (1972), McNair Report (1944), Robbins Report (1963), Schools Council (1972a, 1972b, 1973a, 1973b, 1974/75, 1977a, 1977b, 1978a, 1978b) and Tolley and Reynolds (1977).

7. "Harambee" is Kenya's national motto which, literally translated from Kiswahili, means '"Let us pull together"; the slogan for "Self-help"' (see Republic of Kenya, 1979a: 523).

8. The "Harambee" educational institutions are founded solely through the collective self-help efforts of the social community and may, or may not, receive some limited assistance from the government. However, "private" educational institutions are established by private individuals and/or organisations, in some cases as commercial enterprises, to provide some education services for those who can afford to pay the fees charged; but these institutions receive no assistance from the government. To the extent that these "Harambee" and "private" institutions are not founded by the government, they can thus all be jointly called "private educational institutions", as opposed to the official government-founded schools and colleges. Nevertheless, the quality and quantity of education provided by these "private" institutions are closely monitored by the Inspectorate Section of the Ministries of Basic and of Higher Education.

9. While "government-maintained" schools and colleges receive full government support, "government-assisted or aided" institutions receive only partial support, for example, either by grants-in-aid, or by contributions towards the building programme, or by the supply and payment of some qualified teachers. (See also Republic of Kenya, 1979a: 157).

10. One Kenya Pound (K£) is equal to Kenya Shillings (KShs.) Twenty (20.00) (CBS, MEPCA: 1980: 3). Put in comparative

terms, one K£ is currently (July 1981) equal to about £1.10 Sterling. Nevertheless, there are 100 cents in one Kenya shilling.

11. Whereas the national total enrolments in primary schools for 1964 include the 26,231 boys and 7,639 girls who were in Primary Standard 8, the figures for 1977 do not take account of this Standard since it was finally phased out in 1966 with the introduction of a seven-year primary education course (see Table 5 in the Republic of Kenya, 1978: 36).

12. The letters shown in brackets correspond with those used in the key to Figure IV.11, pages 231, 232.

13. The average class or grade size is assumed at 40 in Standard I in the districts, and at 45 in the municipalities (see Republic of Kenya, 1979a: 155).

14. Currently, most of the teachers of agricultural science in secondary schools are trained at Egerton National Agricultural College, though graduate teachers undertake their professional Post Graduate Diploma in Education (or Certificate, as it is known in England and Wales) at KUC.

15. Before 1963, the equivalent of university-level education was provided to Kenyans and other East African citizens at two Nairobi institutions, namely, the Royal Technical College, Nairobi, and the Ghandi Memorial Academy, which had been established in 1956. These institutions, which were given formal university status just before Kenya attained her Independence in 1963, focussed attention mainly on technical and commercial education, the areas of specialisation upon which the then new University College of Nairobi continued to concentrate effort under the aegis of the University of East Africa.

16. The numbers in brackets are hereafter used to identify the respective school grades involved in this study.

17. Only one subject in Region 3 (Narok) was 11 years old and she was in Grade 1 (Primary Standard 6).

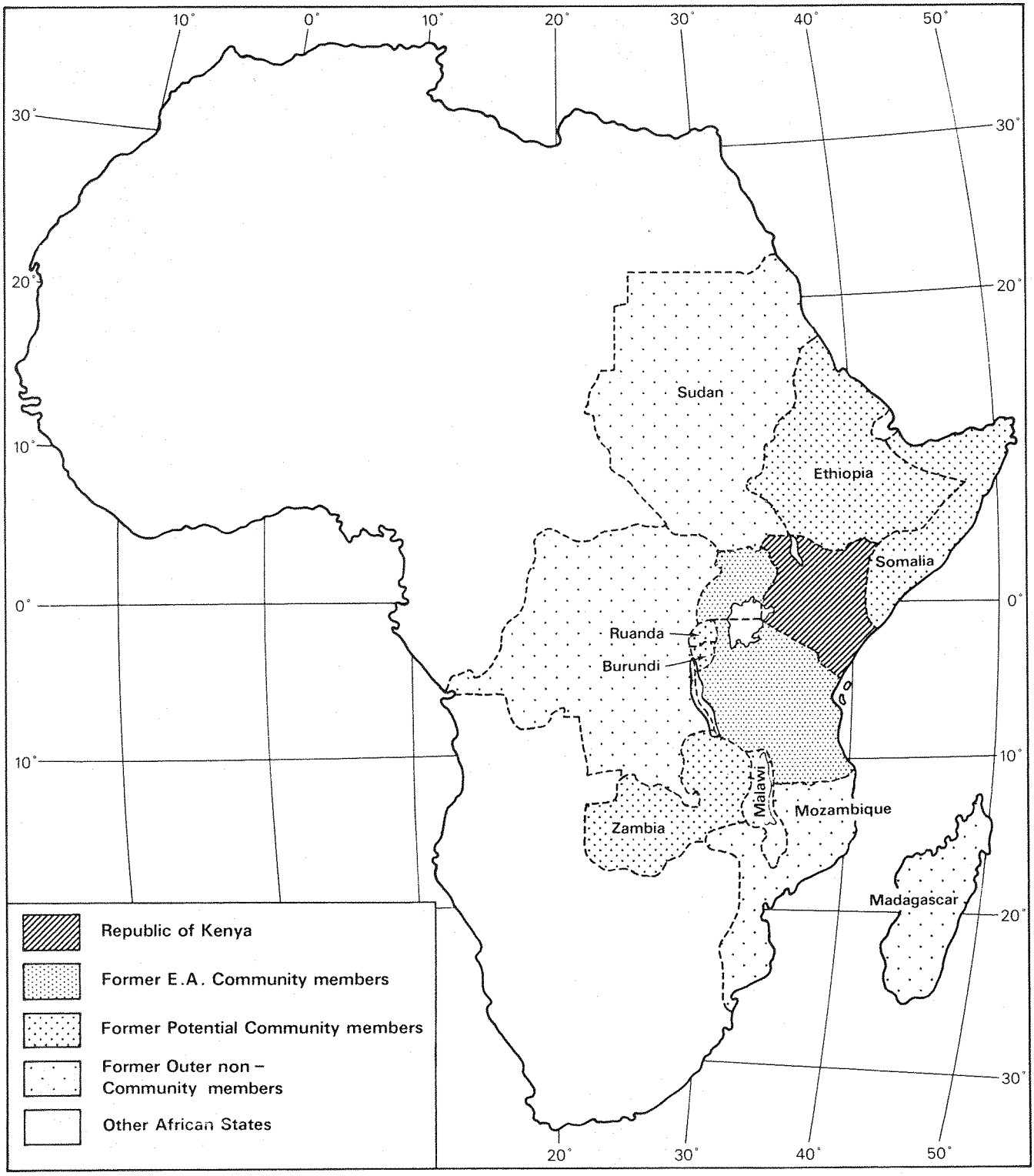


Figure IV.1: Location of the Republic of Kenya in Africa

Key for Figure IV.2, page 221.

Letter	Province	Headquarters ◬
A	Nairobi	Nairobi
B	Central	Nyeri
C	Rift Valley	Nakuru
D	North Eastern	Garissa
E	Coast	Mombasa
F	Western	Kakamega
G	Nyanza	Kisumu
H	Eastern	Embu

No	District	Headquarters ●
1	Nairobi	Nairobi
2	Kiambu	Kiambu
3	Narok	Narok
4	Kitui	Kitui
5	Mandera	Mandera
6	Isiolo	Isiolo
7	Wajir	Wajir
8	Garissa	Garissa
9	Tana river	Galole
10	Lamu	Lamu
11	Kilifi	Kilifi
12	Taita	Wundanyi
13	Kwale	Kwale
14	Mombasa	Mombasa
15	Turkana	Lodwar
16	Marsabit	Marsabit
17	West Pokot	Kapenguria
18	Samburu	Maralal
19	Trans Nzoia	Kitale
20	Elgeyo Marakwet	Tambach
21	Baringo	Kabarnet
22	Laikipia	Nanyuki
23	Bungoma	Bungoma
24	Busia	Busia
25	Kakamega	Kakamega
26	Uasin Gishu	Eldoret
27	Nandi	Kapsabet
28	Siaya	Ukwala
29	Kisumu	Kisumu
30	Homa bay	Homa bay
31	Kisii	Kisii
32	Kericho	Kericho
33	Nakuru	Nakuru
34	Nyandarua	Thomson's Falls
35	Nyeri	Nyeri
36	Meru	Meru
37	Kirinyaga	Kerugoya
38	Embu	Embu
39	Muranga	Fort Hall
40	Machakos	Machakos
41	Kajiado	Kajiado

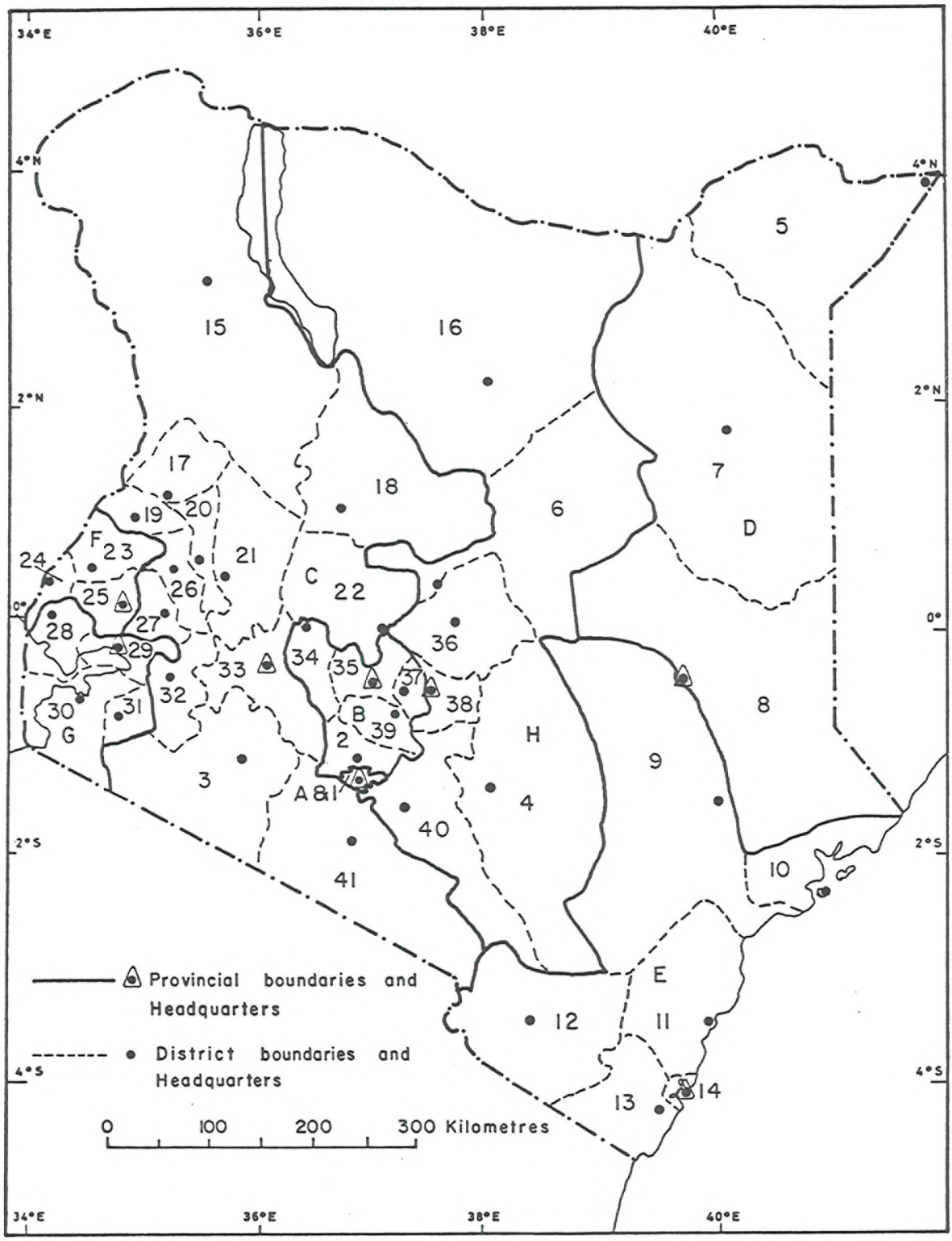


Figure IV·2: Kenya: Provincial and District boundaries and Headquarters, 1968.

TABLE IV.1

KENYA'S EIGHT ADMINISTRATIVE PROVINCES, THEIR RESPECTIVE APPROXIMATE AREAS AND HEADQUARTERS

Number	Name of the Province	Area of the Province in km^2 (and square miles)	Provincial Headquarters
1. (C)*	Rift Valley	173,868.0 (67,917.0)	Nakuru
2. (H)	Eastern	157,891.0 (61,676.0)	Embu
3. (D)	North Eastern	126,902.2 (49,571.0)	Garissa
4. (E)	Coast	86,603.2 (33,829.4)	Mombasa
5. (G)	Nyanza	16,162.0 (6,313.3)	Kisumu
6. (B)	Central	13,176.0 (5,146.9)	Nyeri
7. (F)	Western	7,360.0 (2,875.0)	Kakamega
8. (A)	Nairobi Metropolitan	684.0 (267.2)	Nairobi
	Approximate Total Area	582,646.4 (227,596.3)	

* These letters correspond to those used to identify the provinces in the Key to Figure IV.2, pages 220, 221.

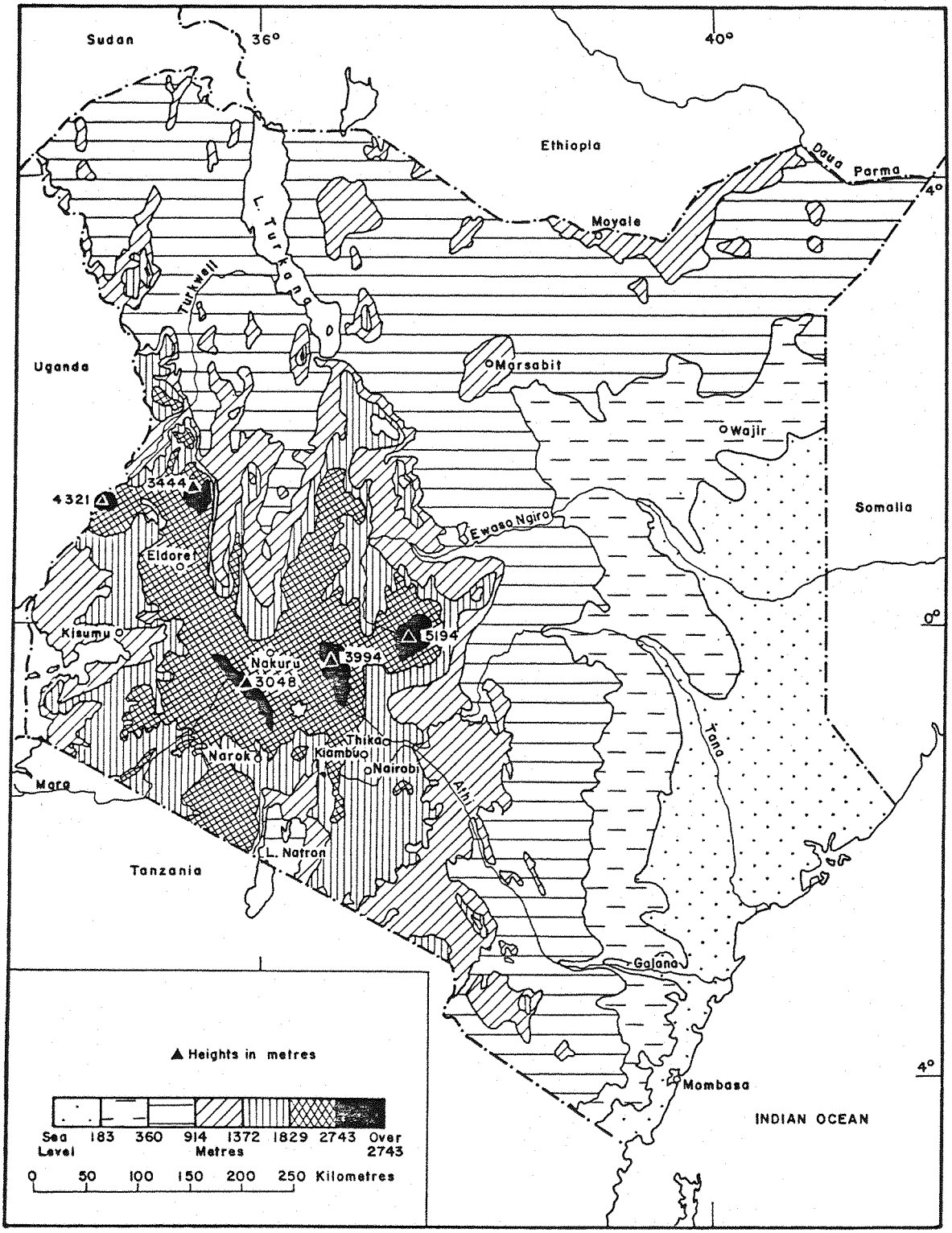
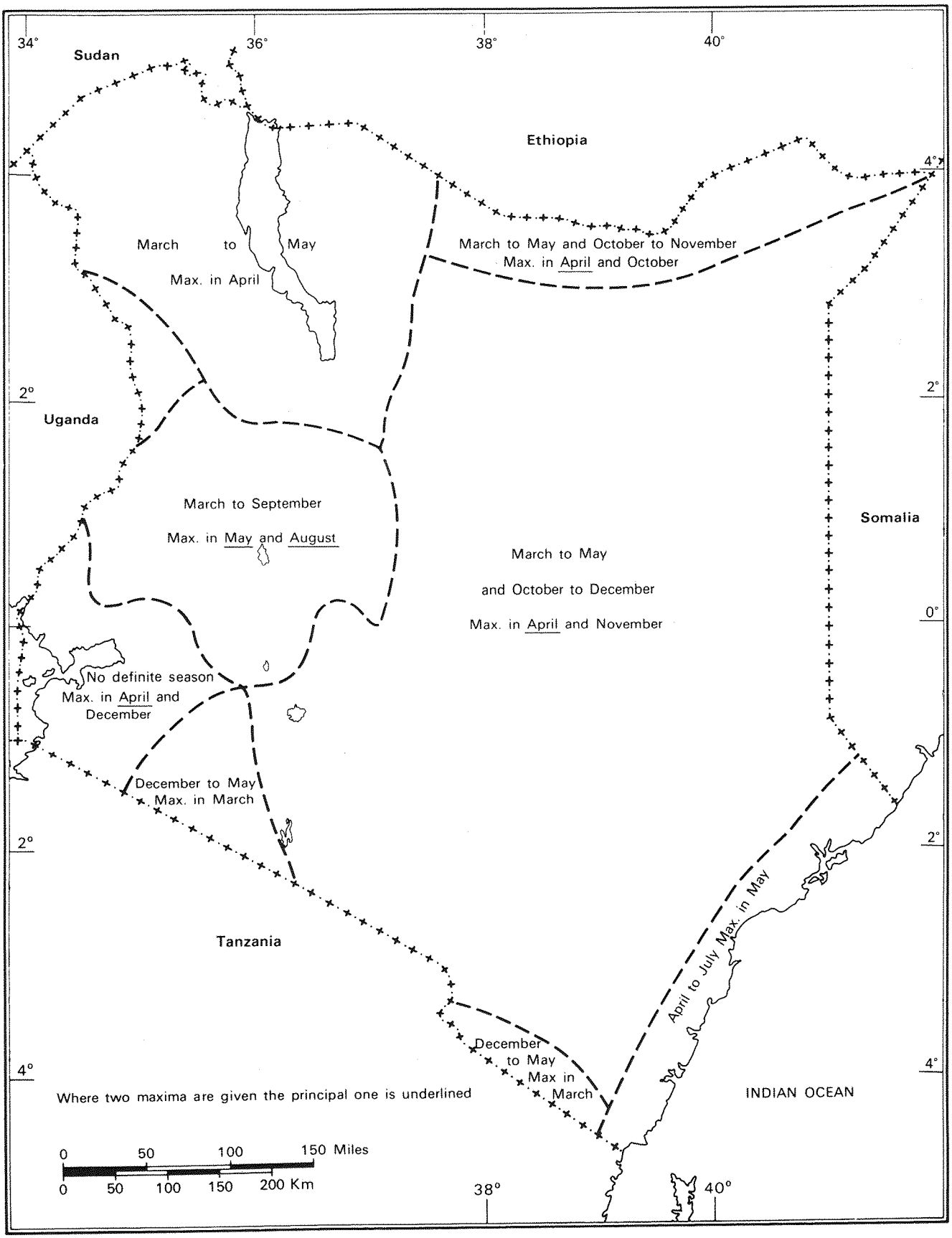
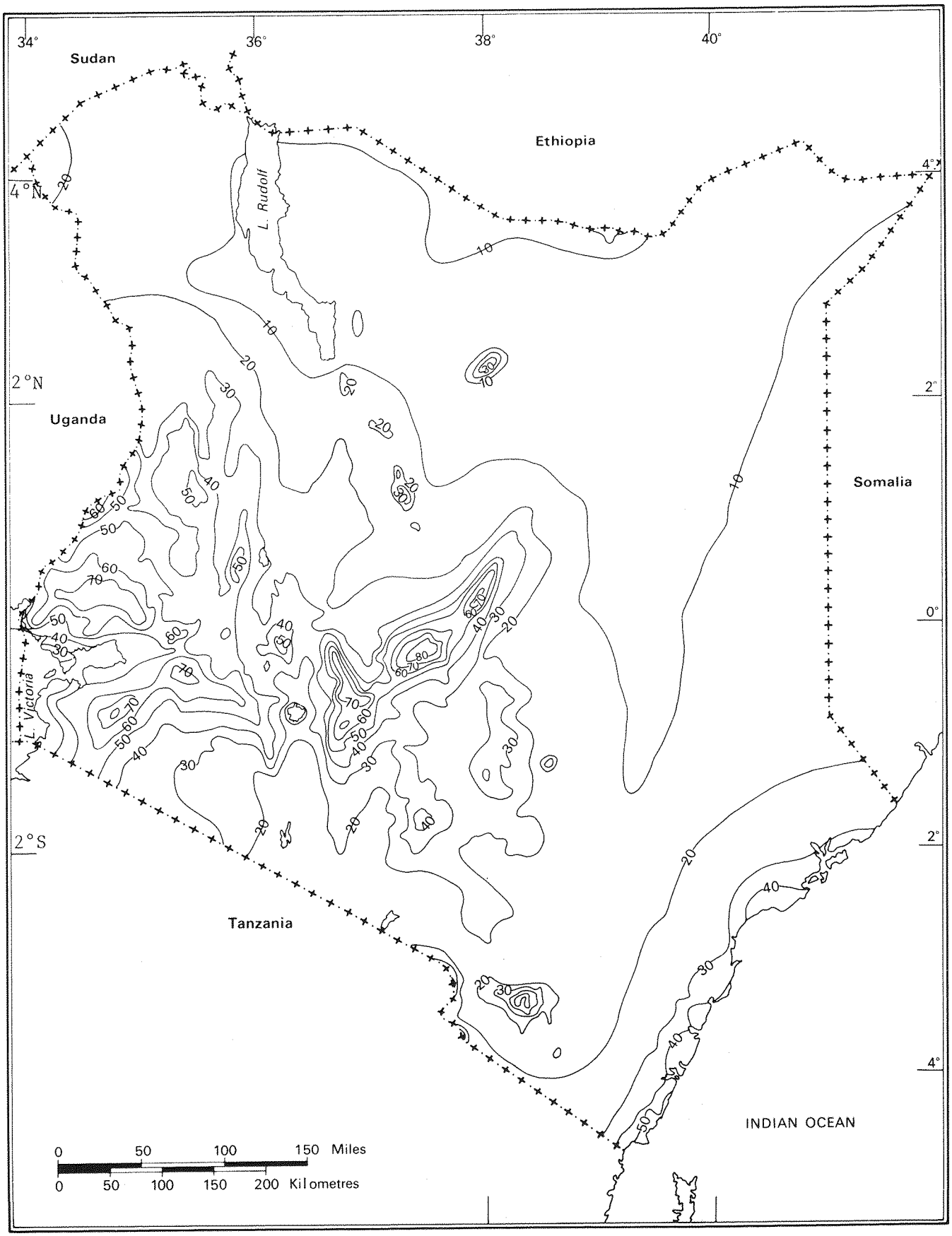


Figure IV-3: Relief and drainage of Kenya., based on maps in Republic of Kenya (1970: 4-13), and in Ojany and Ogendo (1973: 39).



Source: Adapted from Ojany and Ogendo (1973: 57).

Figure IV.4: Kenya: The Main Rainy Seasons.



Source: Adapted from Republic of Kenya (1970: 14-19), and Ojany and Ogendo (1973: 63).

Figure IV.5: Kenya: Mean Annual Rainfall in inches (1 inch = 25.4 mm; 10 inches = 254 mm)

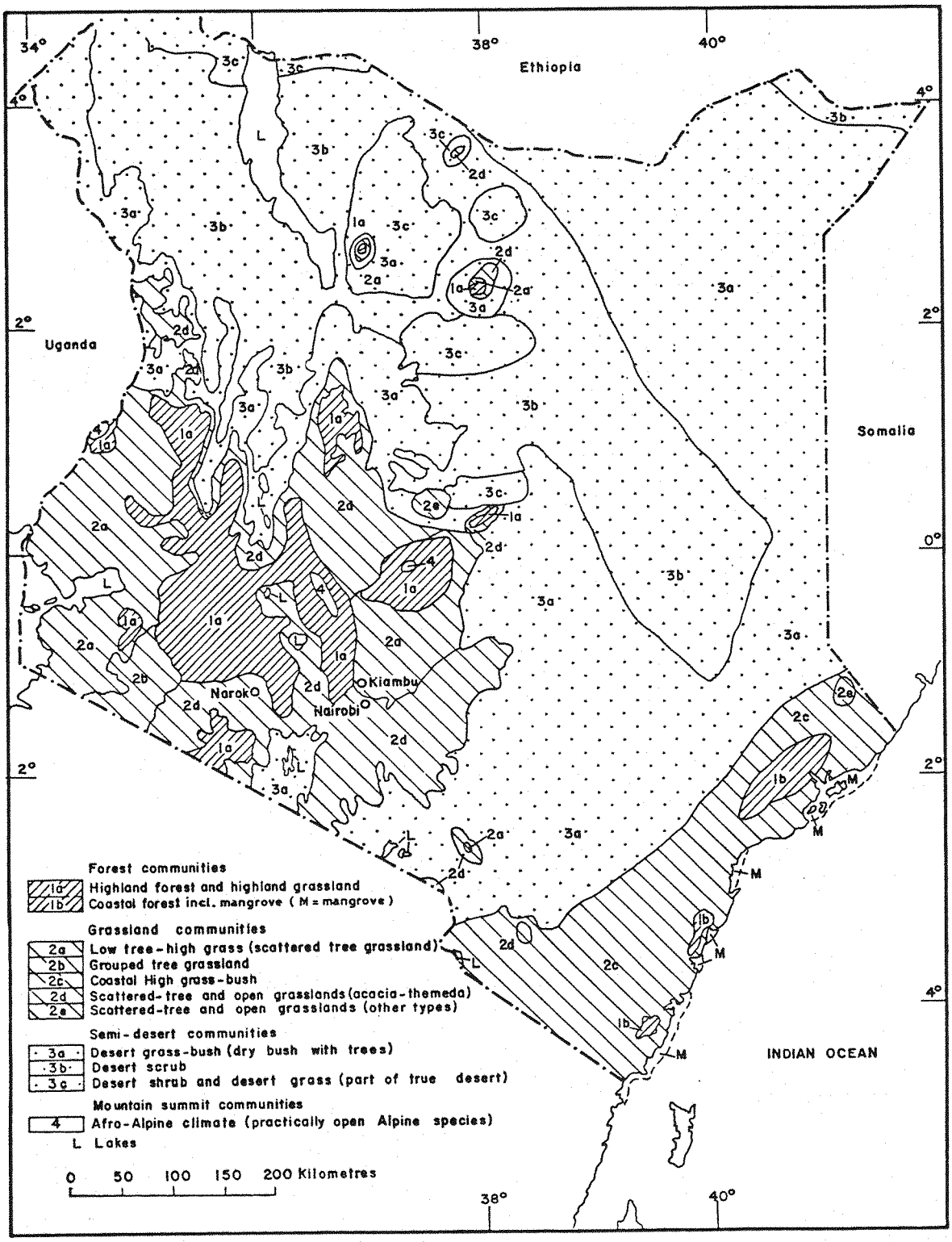


Figure IV·6 : Vegeto-ecological regions of Kenya, based on maps in Republic of Kenya (1970: 29, 31 and 57), and in Ojany and Ogendo (1973: 89).

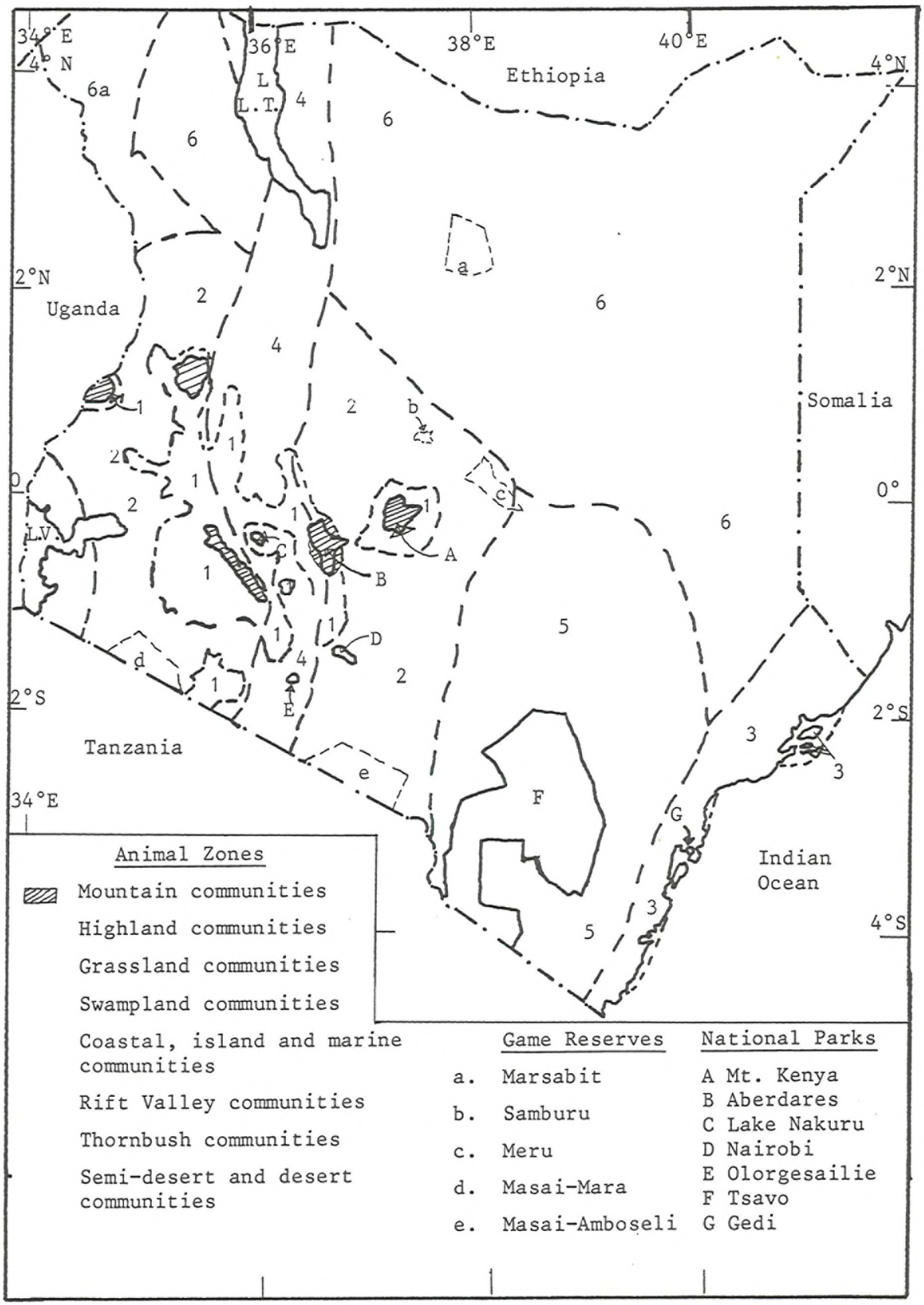


Figure IV.7: Kenya: Distribution of the Major Animal Communities, National Parks, and Game Reserves.

Sources: Ogendo (1972: 179); Ojany and Ogendo (1973: 89).

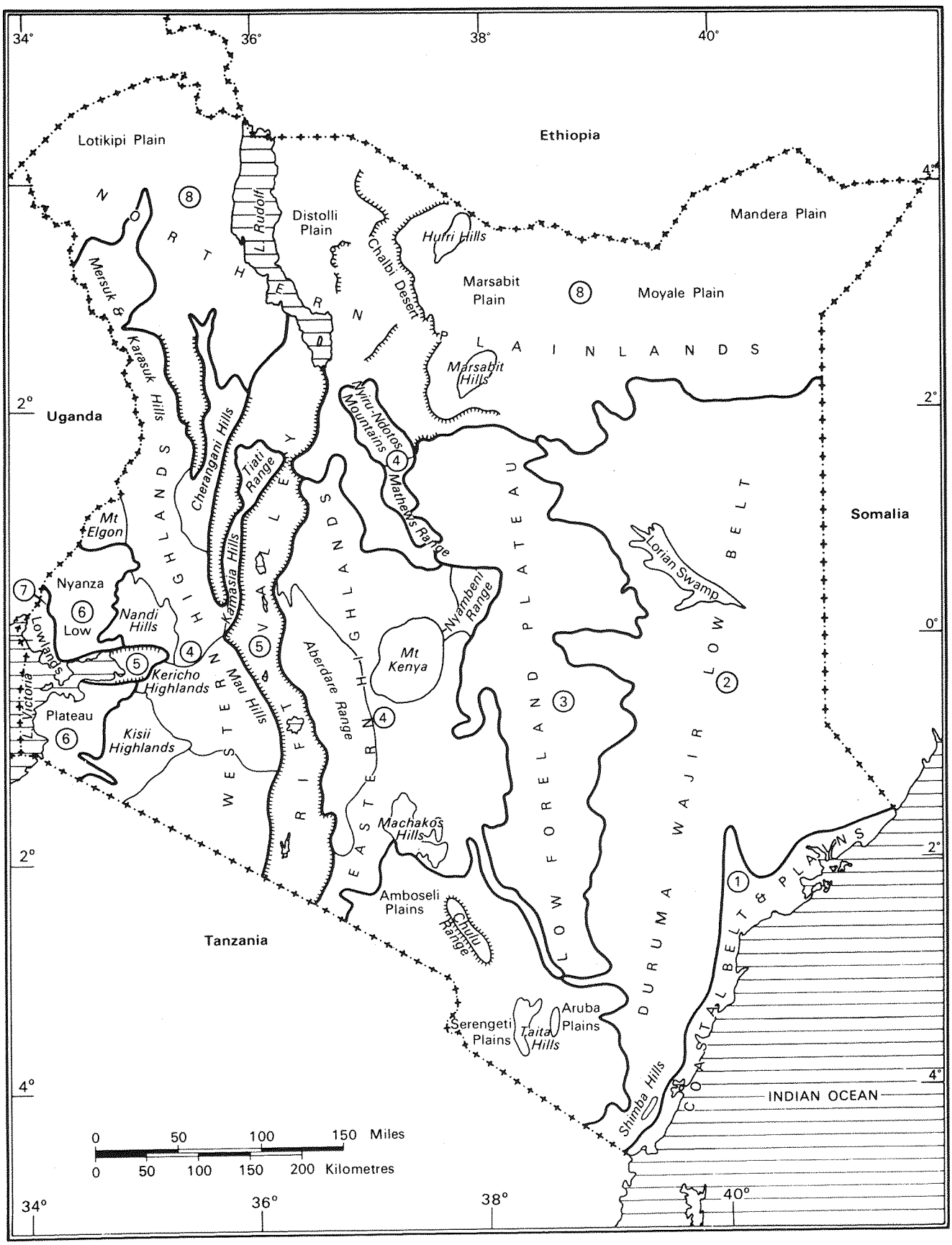


Figure IV.8: The Main Geographical Regions of Kenya, based on the maps in Republic of Kenya (1970), and in Ojany and Ogendo (1973: 42).

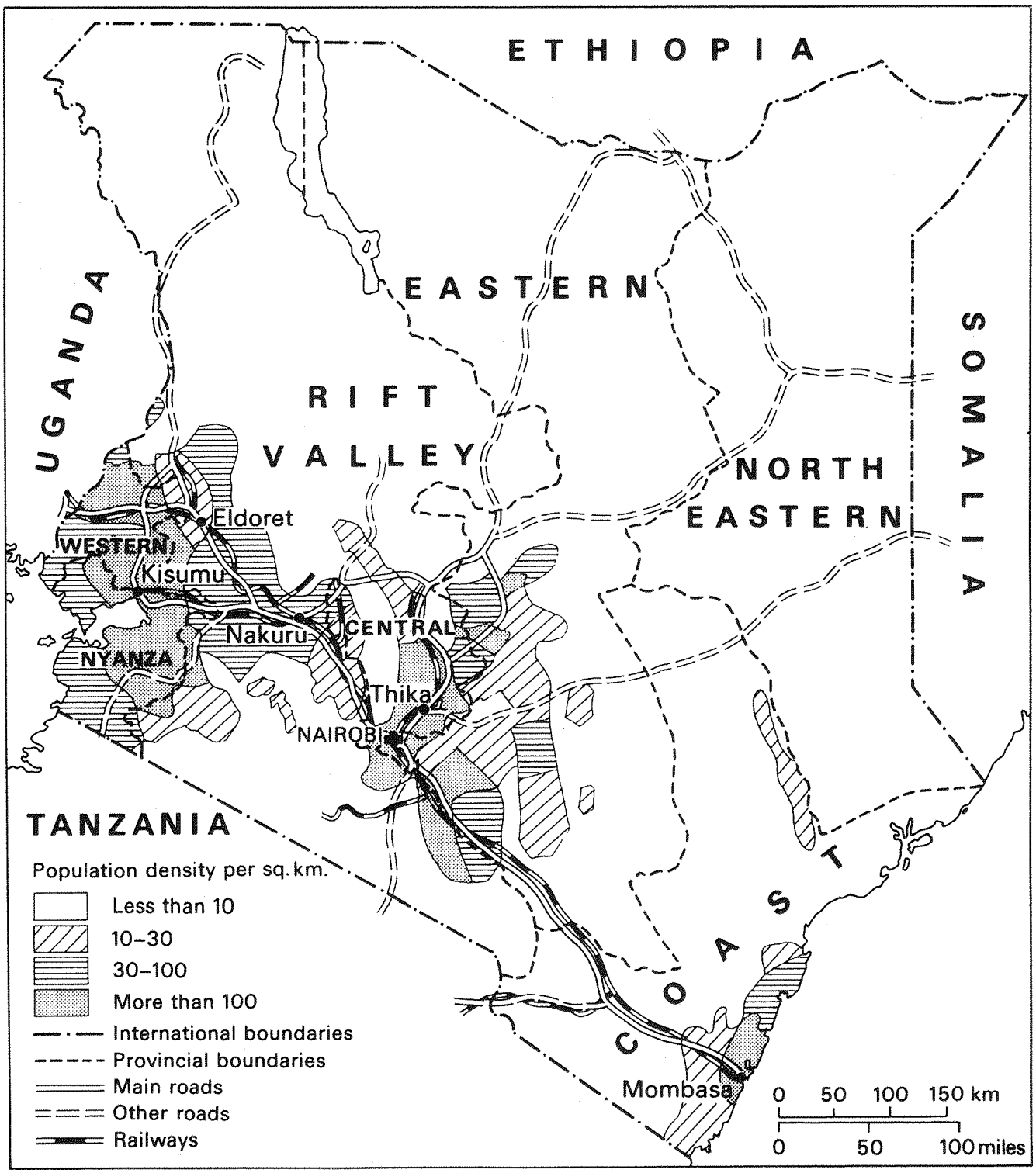


Figure IV.9: Kenya: Density of Population, based on maps in Republic of Kenya (1970: 49), and in Hazlewood (1979).

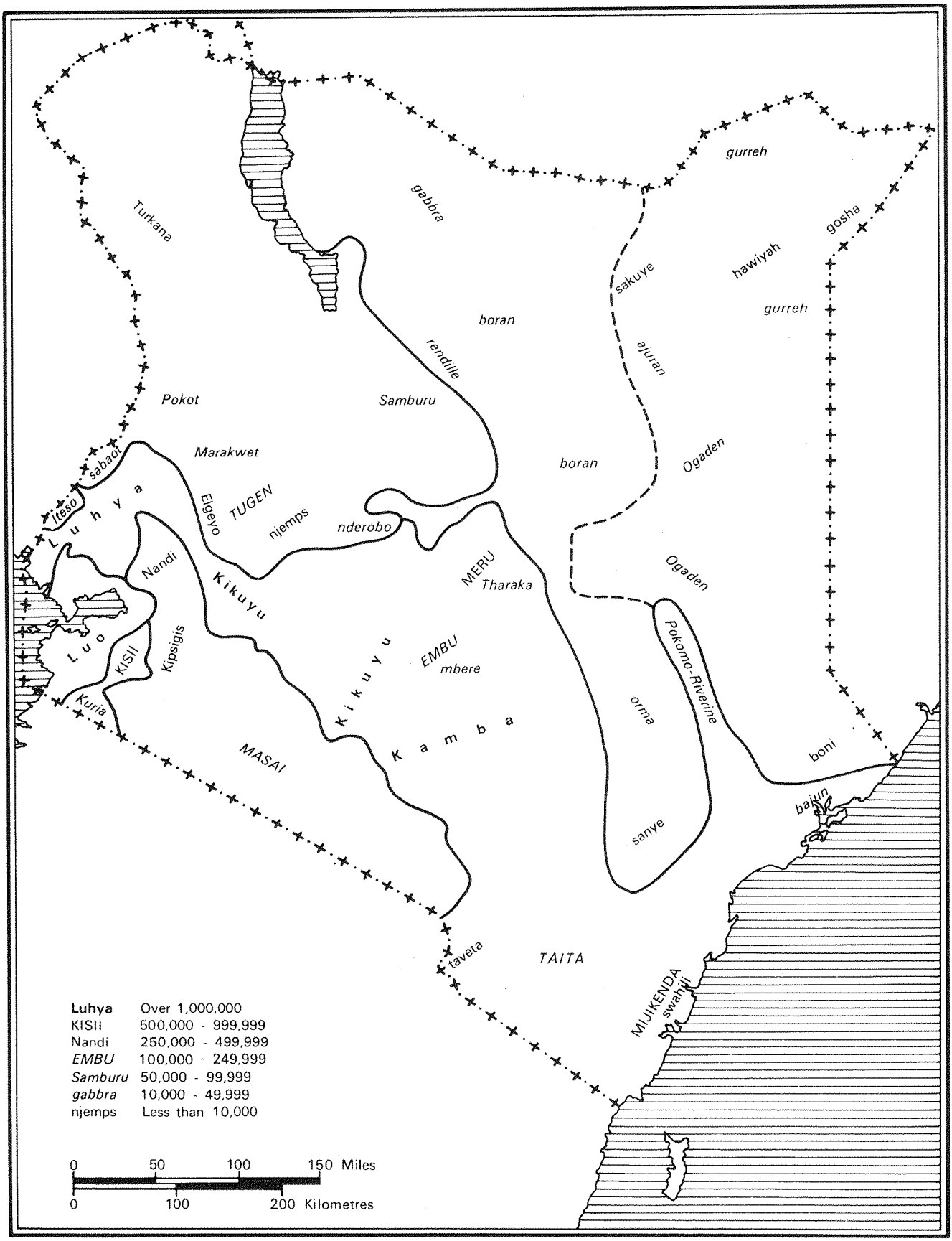


Figure IV.10: Kenya: The Distribution of the Main Tribal Groups, based on maps in Republic of Kenya (1970: 51), and in Ojany and Ogendo (1973: 118).

Key for Figure IV.11, page 232, with Some Explanatory Notes

A. THE ELEMENTARY OR BASIC PRIMARY EDUCATION LEVEL:

a - Pre-Primary Education (Child-care Centres and Nursery Schools).

b - Current 7-Year Formal Primary Education Course.

b_1 - Certificate of Primary Education (CPE) obtained currently after the 7-years' course.

c - The Proposed 9-Years' Primary Education Course, after which the CPE will be awarded.

d - The "Harambee" Village Polytechnics to which some of the CPE graduates go for basic pre-vocational training.

B. THE SECONDARY (ACADEMIC AND VOCATIONAL) EDUCATIONAL LEVEL:

e_1 - The 4-years' Course of Formal Secondary Education (Forms I-IV) in government-maintained/aided and/or assisted national and provincial secondary schools.

e_2 - Kenya Certificate of Education (KCE) (GCE-Ordinary Level) awarded after the 4-years' secondary education course in government and "Harambee" secondary schools.

e_3 - "Harambee" secondary schools offering the course leading to the KCE, with a terminal examination at the end of Form II.

e_4 - The Kenya Junior Secondary Examination (KJSE) taken by all students in "Harambee" secondary schools at the end of Form II. It is proposed to replace this examination with the CPE one when the 9-years' primary course is introduced. The successful candidates may continue either to academic secondary schools for another 2 years to take their KCE examinations, or to:

f - The 2-years Technical School Education leading to some Vocational Qualifications (V.Q.). The rest of the candidates may join the employment sector (E.S.) directly.

g_1 - Successful KCE candidates undertake the 2-years' higher secondary education course leading to the award of the Kenya Advanced Certificate of Education (KACE or GCE-Advanced Level).

C. THE TERTIARY AND HIGHER EDUCATION LEVEL:

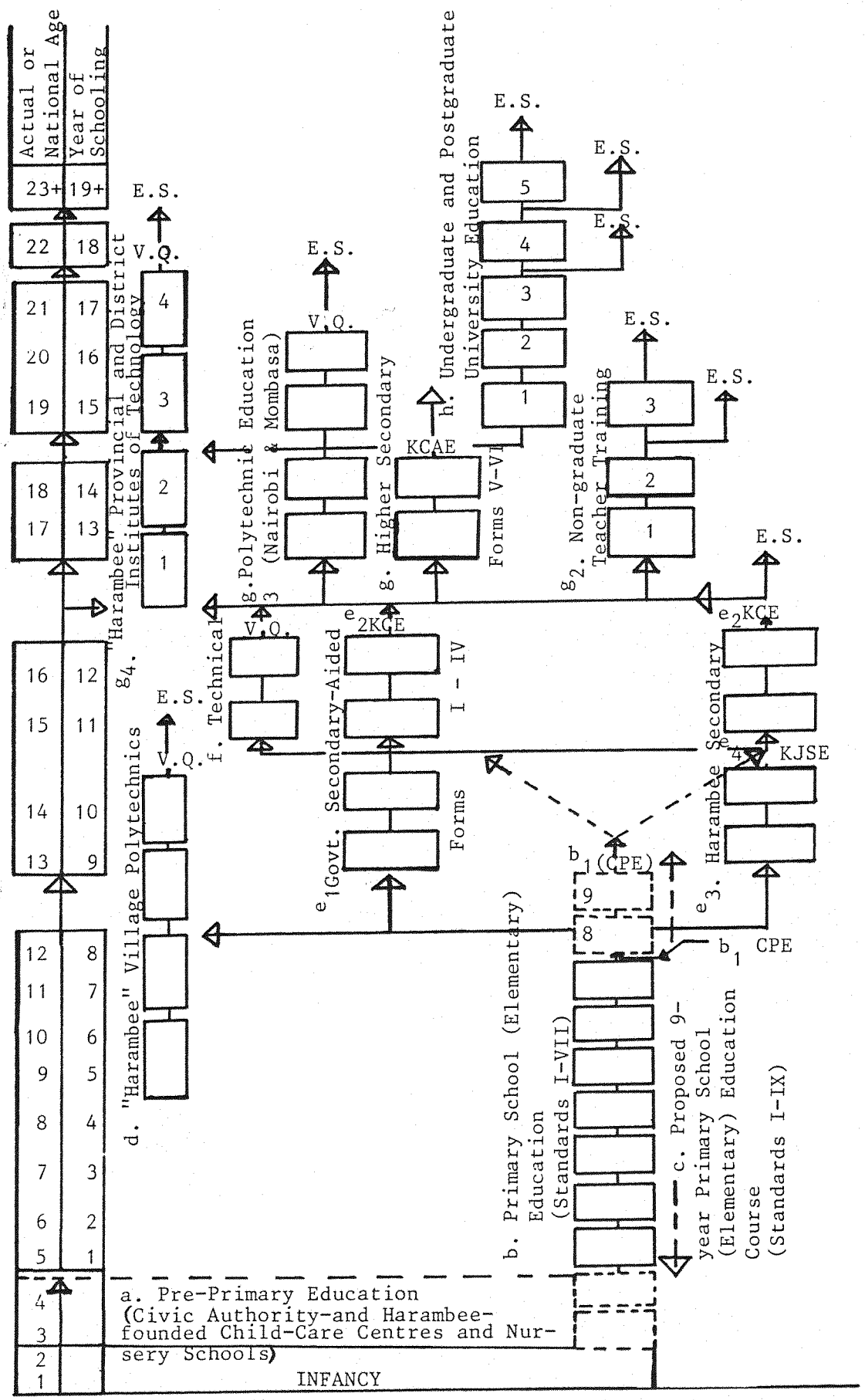
g_2 - Some KCE candidates may join any of the tertiary professional training colleges - for example, KSTC (for S_1 or lower secondary school teachers); and the Kenya Technical Teacher Training College, Nairobi (KTTTC) for their diploma courses.

g_3 - Other KCE candidates may join either the Kenya Polytechnic, Nairobi or the Mombasa Polytechnic Colleges for their professional (technical and commercial) qualifications.

g_4 - The rest of the KCE candidates, who cannot find places in any of the other institutions, may join any of the 12 to 15 Provincial and District "Harambee" Institutes of Technology for their vocational training, after which they join the employment sector (E.S.).

h - Most of the successful KACE candidates undertake University 3/4/5-years' baccalaureate first degree and/or diploma courses at the University of Nairobi (UON) or at Kenyatta University College (KUC) or in some foreign countries. These institutions of higher learning also mount various post-graduate academic and professional courses for Kenyan and foreign graduate students.

Figure IV.11: KENYA: The Structure of the Formal Education System (Not to Scale)



Source: Author.

TABLE IV.2

A TABULATED SUMMARY OF THE DISTRIBUTION AND PERCENTAGES OF SUBJECTS IN THE RESEARCH SAMPLE BY REGION, SEX AND AGE GROUPS (N = 270)

	Region 1		Region 2		Region 3		N[a]		%[a]		Overall Total[b]	
Sex / Age Group	M	F	M	F	M	F	M	F	M	F	N	100%
11 years	11	7	1	-	-	1	12	8	4.44	2.96	20	7.41
12 years	4	12	3	6	-	4	7	22	2.59	8.15	29	10.74
13 years	3	10	5	7	3	5	11	22	4.07	8.15	33	12.22
14 years	12	1	12	10	13	4	37	15	13.70	5.56	52	19.26
15 years	5	2	5	8	1	10	11	20	4.07	7.41	31	11.48
16 years	10	13	5	6	11	7	26	26	9.63	9.63	52	19.26
17 years	-	-	9	4	8	12	17	16	6.30	5.92	33	12.22
18 years	-	-	4	4	4	1	8	5	2.96	1.85	13	4.81
19 years	-	-	-	-	3	-	3	-	1.11	-	3	1.11
20 years	-	-	1	-	2	1	3	1	1.11	0.37	4	1.48
TOTAL	45	45	45	45	45	45	135	135	(49.98) 50	50.0	270	(99.99) 100.00

Source: Author.

Notes: a = Sub-total numbers and percentages of male and female subjects per age group within the 3 research regions of Kenya (1 = Nairobi, 2 = Kiambu, and 3 = Narok).

b = Overall total numbers and percentages of all subjects in the sample per age group within the 3 research regions.

* The data in this table is extracted from Appendix IV.1, page 459, which outlines, in tabulated form and in greater detail, the distributional characteristics of the subjects in the present research sample.

TABLE IV.3

THE KENYAN PRIMARY AND SECONDARY SCHOOLS INVOLVED IN THE RESEARCH IN 1980 BY TYPE, AND LOCATION IN THE RESEARCH REGION, DIVISION, DISTRICT, AND PROVINCE, AND THEIR ENROLMENTS

(N = 7)

Region	No.	School	Type	Division	District	Province	ENROLMENT Male	Female	Total
1 (Urban-Nairobi)	1.	St. Michael's	Primary (Co-educational)	Makadara	Eastern	Nairobi	532	434	966
	2.	State House Girls' High	Secondary (Girls)	Central	Central	Nairobi	-	574	574
	3.	Strathmore College Secondary	Secondary (Boys)	Western	Dagoretti	Nairobi	268	-	268
2 (Peri-urban-Kiambu)	4.	Kabuku	Primary (Co-educational)	Limuru	Kiambu	Central	263	268	531
	5.	Kiambu High	Secondary (Co-educational)	Kiambaa	Kiambu	Central	234	188	422
3 (Remote-rural -Narok)	6.	Il Masharian	Primary (Co-educational)	West Mau	Narok	Rift Valley	298	216	514
	7.	Narok High	Secondary (Co-educational)	West Mau	Narok	Rift Valley	411	198	609
						Total	2006	1878	3884

TABLE IV.4

DISTRIBUTION AND PERCENTAGES OF THE RESEARCH SAMPLE (n) AND STRATUM POPULATION (N) BY REGION, SCHOOL, AND GRADE

(n = 270; N = 3884)

Region	No.	Stratum (School)	Research Grades	Sample (n)	Stratum Population (N)	Percent
1 (Urban: Nairobi)	1.	St. Michael's Primary	1	30	966	3.11
	2.	State House Girls High	2 3	15) 15) 30	574	5.23
	3.	Strathmore College Secondary	2 3	15) 15) 30	268	11.20
		Sub-total	5	90	1808	
2 (Peri-urban: Kiambu)	4.	Kabuku Primary	1	30	531	5.65
	5.	Kiambu High	2	30	422	14.22
			3	30		
		Sub-total	3	90	953	
3 (Remote-rural: Narok)	6.	Il Masharian Primary	1	30	514	5.84
	7.	Narok High	2	30	609	9.85
			3	30		
		Sub-total	3	90	1123	
		Overall Total	11	270	3884	(6.95) 7.00

TABLE IV.5

MEAN AGES OF ALL SUBJECTS BY REGION, SEX AND GRADE

(N = 270)

Regions	1			2			3			
Sex / Grades*	M	F	Regional Mean	M	F	Regional Mean	M	F	Regional Mean	Overall Regional Mean
1	11.3	11.5	11.4	13.2	13.0	13.1	15.7	13.3	14.1	12.85
2	13.8	12.8	13.3	14.9	14.2	14.5	15.2	15.1	15.2	14.34
3	15.7	15.9	15.8	17.3	16.7	17.0	17.7	17.1	17.4	16.73
						Overall Mean				14.64

Note: Total age for 270 subjects in 3 regions = 3954 years;

∴ Either Overall Mean age for all 270 subjects in 3 regions =

$$\frac{3954}{270} = 14.64 \text{ years;}$$

or $\frac{12.85 + 14.34 + 16.73}{3} = \frac{43.92}{3} = 14.64$ years

* Grade 1 = Primary Standard 6; Grade 2 - Secondary Form 1; and Grade 3 = Secondary Form 3.

TABLE IV.6

ENROLMENT, DISTRIBUTION AND OVERALL PERCENTAGES OF SAMPLE IN RESEARCH SCHOOLS* BY GRADE AND SEX (1980)

Region			Grade 1			Grade 2			Grade 3			Sample			OVERALL TOTAL				
	Sex / No.	School	M	F	Sub-total	M	F	Sub-total	M	F	Sub-total	M	F	Sub-total	M	F	Enrolt.	Sample	Percentage of Sample Total
1 (Urban: Nairobi)	1.	St. Michael's Primary	76	62	138	-	-	-	-	-	-	15	15	30	76	62	138	30	21.74
	2.	State House Girls' High	-	-	-	-	120	120	-	124	124	-	30	30	-	244	244	30	12.30
	3.	Strathmore College Secondary	-	-		60	-	60	40	-	40	30	-	30	100	-	100	30	30.00
2 (Peri-urban: Kiambu)	4.	Kabuku Primary	41	41	82	-	-	-	-	-	-	15	15	30	41	41	82	30	36.59
	5.	Kiambu High	-	-	-	47	39	86	46	40	86	30	30	60	93	79	172	60	34.88
3 (Remote-rural: Narok)	6.	Il Masharian Primary	44	42	86	-	-	-	-	-		15	15	30	44	42	86	30	34.88
	7.	Narok High	-	-	-	87	43	130	78	45	123	30	30	60	165	88	253	60	27.72
		Total	161	145	306	194	202	396	164	209	373	135	135	270	519	556	1075	270	25.1

* The total research sample of 270 subjects accounted for 25.1 per cent of the total enrolment of 1075 pupils in all the research grades of the 7 schools

Key for FigureIV.12, page 239.



Provinces from which the research sample was drawn: Nairobi (A); Central (B); and Rift Valley (C).



Districts from which the research sample was drawn: Nairobi (1); Kiambu (2); and Narok (3).



Provinces whose outline maps were used as distracters in Subtest A of the Territorial Decentration Test: North Eastern (D); Coast (E); and Western (F).



Districts whose outline maps were used as distracters in Subtest A of the Territorial Decentration Test: Kitui (4); Mandera (5); and Isiolo (6).

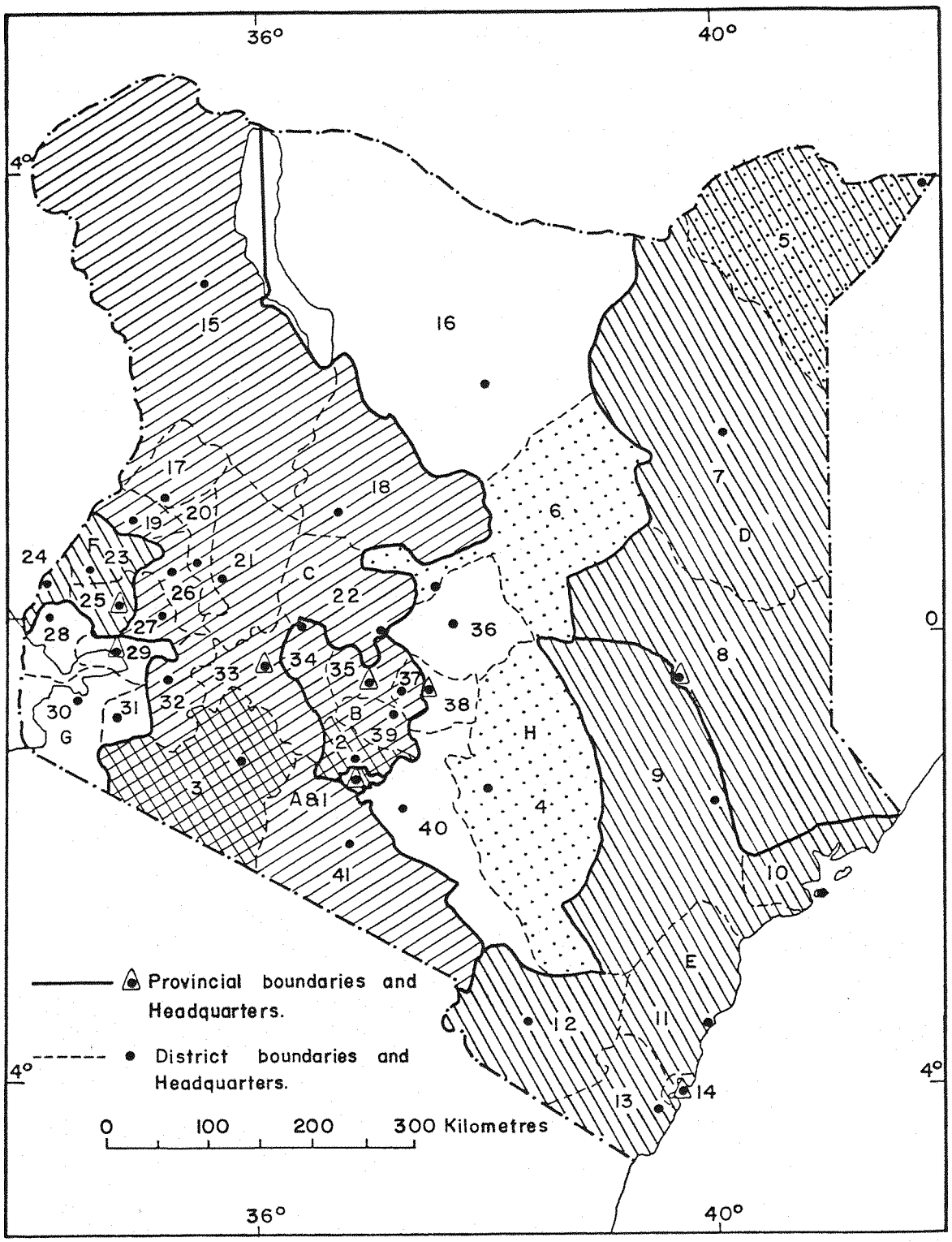


Figure IV-12 : Kenya: Provinces and Districts from which the research sample was drawn, and those whose outline maps were used as distracters in Subtest A of the Territorial Decentration Test.

TABLE IV.7

THE REGIONAL PROPORTION OF THE RESEARCH SAMPLE (n) AND POPULATION (N)

(n = 270; N = 3884*)

No.	Region	Sample (n)	Percentage of Sample (n)	Population (N)	Percentage of of Population (N)
1.	Urban (Nairobi)	90	33.33	1808	46.55
2.	Peri-urban/ Semi-rural (Kiambu)	90	33.33	953	24.54
3.	Remote-rural (Narok)	90	33.33	1123	28.91
	Overall Total	270	(99.99) 100.00	3884	100.00

* This figure represents the total enrolments for 1980 in the 7 primary and secondary schools which participated in the research.

TABLE IV.8

STRATIFICATION OF THE BACKGROUND VARIABLES OF THE RESEARCH SAMPLE

Stratum	Variable
1	Age[a]
2	Grade Level[b]
3	Sex (Male-Female)
4	PEERE[c]
5	SESP[d]

Notes:

a = The age range for the sample was 11 to 20 years, and the overall mean age was 14.64 years (see also Tables IV.2 and IV.3 pages 233 and 234, respectively.

b = The school grades used were: 1 = Primary Standard 6; Grade 2 = Secondary Form 1 and Grade 3 = Secondary Form 3.

c = The Physico-Eco-cultural Environmental/Residential Regions (PEERE) were 1 = Urban (Nairobi), 2 = Peri-urban/Semi-rural (Kiambu), and, 3 = Remote-rural (Narok).

d = The Socio-Economic Status of the Parents (SESP) Categories were: 1 = I, 2 = II, 3 = III, 4 = IV, 5 = V, 6 = VI, and 0 = Don't Know (see Table III.4, page 144).

CHAPTER V

THE PROCESS AND PROCEDURES OF RESEARCH INSTRUMENTATION

V.0 Introduction

The preceding chapter described the general setting and experimental aspects of the present study. This chapter undertakes a description of the process of instrumentation through which the empirical data for this research were obtained. Thus, the following research elements will be specifically dealt with:

a. the background questionnaire and interview schedule;
b. the selection of the evaluative measures;
d. the instruments (tasks or tests) and materials, which were used to operationalise the various experimental criteria under present investigation, and the procedures of administering and scoring each of the experimental criterion instruments.

V.1 The Background Questionnaire and Interview Schedule

It was shown in Chapters III and IV that one of the aims of this research was to investigate, inter alia, the relative influence of a number of personal and social background variables of this study's subjects in their development of territorial decentration. The background variables thus considered were the age, sex, grade/class or year of schooling, SESP and PEERE of each of the 270 participating subjects.

As noted earlier, a three-pronged approach was employed to collect and compile as accurately as possible information relevant to the variables named above. In the first instance, as much of the relevant information as possible was extracted from the various school records. These records were the students' personal files, in which could be found the information supplied by their parents, and the class attendance registers. All this information was confidentially recorded in the "Research Master File" as well as in the subjects' protocols compiled by the present investigator.

Secondly, a short background information questionnaire was used to obtain the necessary information directly from the subjects themselves. To

avoid arousing unnecessary suspicion amongst the subjects, which might have tempted them to supply unreliable information, this questionnaire was simply called an "Information Form". As shown in Appendix V.1, page 460, the Form was the first (top) page of the main criterion instrument used in this research, namely, the Territorial Decentration Test (TDT).

This short questionnaire was administered in each of the research schools to all the subjects during a "general conference" held prior to the beginning of the experimental phase. Each "conference" provided the necessary forum at which the investigator met all the participating subjects in a particular school, and explained to them the purpose and procedures of the research. Before they were all instructed to return to their classes, and in order to prime them for the various experimental tasks they were due to perform, the subjects were guided to fill in the information required for items 2-15 of the Form. Therefore, since the questionnaire was collectively administered to all the research groups in the schools concerned, a very high rate of response was realised in most cases. However, those subjects, who failed to attend the "general conference" were asked to complete the questionnaire before they started performing the experiments. These approaches to the administration of the questionnaire resulted in a final response rate of 100 per cent.

Thirdly, the investigator interviewed each of the subjects as he/she turned up to perform the experimental tasks in the "research room". The questions in this "informal interview schedule" are indicated in Appendix V.1, page 460. During this brief interview, the subject was not allowed to refer to the information in the Form at the top of the "protocol", which had been completed at the "general conference". The purpose of such a method of presentation was to ensure that the information obtained from the school records and the subjects themselves tallied with what the subjects provided orally. In cases where this information did not tally, the investigator asked further exploratory questions to help the subject(s) concerned to provide the correct information to the best of their ability. In a few cases, this exercise helped some school authorities to correct their records in the light of the information collected from the subjects. Furthermore, items 17-21 on the Information Form

were also completed with the investigator's guidance during this interview period. This was so because these items required a greater amount of probing and explanation than the rest, especially item 21, which was included to provide information of a general nature. Items 16, 22 and 23, however, were completed by the investigator at the end of the experiment. Under item 22, the investigator recorded the subject's category of SESP, as determined according to the criteria outlined in Appendix II.6 , pages 455-458, the stage of territorial decentration and any such information about that subject's performance as appeared.

V.2 Selection of the Research Instruments

A number of considerations guided the process and procedures of selecting the most relevant and appropriate research instruments or evaluative measures, which were eventually used to operationalise the investigation of the influence of the experimental variables. These considerations, several of which were discussed in Chapter II.7, pages 111 -116, are as outlined below.

Firstly, account was taken of the extent to which the experimental tasks and materials selected were, or could be made, culturally-relevant and applicable to the local Kenyan context. The investigator discovered that there were two main types of psychological tests from which tasks for the present research could be selected, namely, the "culture-free" and "culture-fair" tests. According to Dasen (1970: 62), "culture-free" tests, on the one hand, are those tasks 'constructed by European psychologists, and are applied to other cultures without modification of content, form, presentation, or norms, except for the translation of the instructions'. "Culture-fair" tests are, on the other hand, 'tests constructed by European psychologists, but (can be, or are in fact) adapted to suit a particular culture in their content and presentation; (and in which) the norms, validity, and reliability are established for the culture under study as well as for Europeans'. Thus, in view of the attempts the present researcher made to adapt certain aspects of their content and presentation, the criterion instruments which were finally adopted in this research belong to the category of "culture-fair" or "culture-reduced" tasks, as opposed to that of the "culture-free" psychological tests.

Secondly, to ensure a more objective basis for comparing the cross-cultural performance of the participating subjects, preference in the research instruments was given to standardised experimental tasks, materials and interviewing procedures. Nevertheless, to ensure that the subjects understood the tasks they were required to perform, the present investigator allowed them ample opportunity and time to practise with, and ask general questions about, the materials and procedures due to be used in the main test(s). This familiarity exercise took place during the "orientation period" which preceded, in each case, the main experimental testing phase. It was felt that such an informal and flexible beginning of the experimental phase would help to offset the limitations characteristic of the otherwise inflexible and rigid standardised experimental procedure (see, for example, Voyat (1969) and Dasen, Ngini, and Lavallée, 1979, for a more detailed discussion of this problem).

Thirdly, some of the qualitative aspects of the tasks to be adopted were considered in selecting the instruments for this research. As noted earlier, this research was conducted in English, which is learnt and spoken as a second language by all the Kenyan African children who participated in this investigation. With this in mind, this writer took measures to ensure that the experimental tasks eventually used were not unnecessarily complicated in linguistic terms. The texts of the tasks were modified, where necessary and within acceptable research limits, by eliminating complicated language and technical jargon which most of the children, who participated in the pilot study, found difficult to understand. This pilot administration of the adopted tests was conducted during the period this investigator initially visited each of the selected participating schools. It should be noted that the children, who took part in the pilot study without knowing in fact that the research was due to be conducted in their school(s), were not eventually selected to participate in the actual experimental tests. Thus, whilst the instructions were made simple and clear, the materials selected for use in the adopted tasks were those with which the Kenyan African children were culturally more familiar, as will be shown later.

The fourth factor considered in the selection of the tasks used in this research was their practical applicability in the different experimental

situations found in each of the 7 research schools. Since the research involved covering long distances by road, only those tasks whose materials could be transported by the investigator in a motor-car were selected. In addition, those research instruments dependent on the use of such highly specialised apparatus as the CCTV, epidiascope, or even the overhead projector, could not be chosen for use in this research. This was so because most of the schools involved in this study could not be expected to have all the facilities named above. Emphasis was therefore placed on the selection of those instruments which are mechanically- or manually-operated, as opposed to the electrically-operated and/or automated apparatus.

Fifthly, as was discussed in Chapter II.7, pages 110-112, the combined effects of such practical constraints as the time and financial resources available for undertaking this research greatly influenced the selection of its instruments. Nevertheless, no time limit was set during which a subject had to complete a certain task. Correspondingly, the investigator did not attempt to make the subject(s) work faster, or to give the latter the impression that speed in performing the experimental tasks was the most important consideration in this research. This helped to reduce unnecessary pressure on the subjects and to enhance their ability to think clearly when solving the problems set in the tasks.

Finally, but not least in importance, the factor of ease of accessibility to the sources of the original research instruments to be adopted for use in this study was considered. This necessitated a comprehensive search for the sources of all the potentially suitable instruments through surveying published literature and direct correspondence with the original researchers, who developed the relevant instruments, to obtain, firstly, their permission to use their tests in the present study and, secondly, to obtain from them further specific information about such aspects of test development as item difficulty, content validity and reliability, and any important changes which might have been made in the tests since their original development. In this regard, therefore, the present writer was grateful for the assistance and co-operation he received from the following individual researchers and research organisations: Dr. P.R. Dasen, University of Geneva; Mrs. Leah Ngini, Nairobi; Dr. D. Satterly, University of Bristol School of

of Education; Professor J.P. Stoltman, Western Michigan University, Kalamazoo, Michigan, USA; the Educational Testing Service, Psychological Development Research Division, Princeton, New Jersey, USA; and the NFER Publishing Company, Windsor, England[1].

V.3 The Research Instruments and Materials

This section briefly describes each of the 4 main research instruments or tasks, their materials, and methods of scoring, which were used in this study. At the outset, it is essential to clarify the point that although these criterion tasks are called "tests", the present investigator encouraged, as far as possible, the participating subjects to think and believe that they were "solving some puzzles" or "playing some academic games", as opposed to "taking or performing tests". This measure was necessary to offset the likely occurrence of such negative phenomena as pre-examination "panic" or "fever" and uncertainty, which tend to be experienced by some candidates prior to a major test or examination. This is especially so in East Africa where, as discussed earlier, high importance is attached to the issue of performance in public examinations by the candidates, parents, potential employers and society in general.

V.3.1 The Territorial Decentration Test (TDT)

As was discussed briefly in Chapter II.4, pages 69-100, Stoltman's (October, 1971) revised edition of the TDT was adopted for use, mutatis mutandis, as the main criterion instrument for the present research. Its global purpose is to test the subjects' development of territorial decentration and of the concept of territory and the comparability of Piaget's spatial stages to that development. To quote Stoltman (1971):

> The present instrument (TDT) was developed to remedy the situation (that is, the absence of standardised procedures) by providing a normative, brief, and practical measure of territorial concept development. Prior reports of methodology were evaluated, and the tasks which proved to be interesting to children, easy to administer, readily scored, and judged statistically sound, were included in the test (page 21).

Stoltman addressed himself to the question of content validity of the TDT. He explained that:

> Content validity was attained by using the political titles within the child's environment. Local political titles are usually household words encountered in shopping and educational trips. The larger territories (for example, county, state, and nation) are determined by the child's settlement title (town or city), and constitute the only possible correct responses.
>
> County was included in the present sequence (1971) since it was locally and regionally germane as a unit of territory within the study area. It was recognised that county was not locally germane in numerous areas where the test could be administered. Therefore, local territorial content was maintained by substitution of a locally germane territory, for example, parish, township, borough. Similarly, the examiner inserted valid larger territories by political titles throughout the test. By incorporating such a format, the test was usable in numerous situations where territorial titles vary (1971: 24-25, 1976b: 44-45).

In the present research, therefore, the following examples of political territories, which were considered to be locally and regionally germane within the research regions of Kenya, were accepted as possible correct territorial responses:

a. Nairobi City, or any local shopping/residential areas or administrative divisions within the City's boundary (for example, Dagoretti, Eastleigh, Kabete, Kibera, Makadara, or Westlands, and so on) for Nairobi District, Nairobi Province - Region 1;
b. Kiambu Sub-location, Kiambaa Division, Kiambu Town; and Kabuku or Ngecha trading centres, Ngecha Location, Limuru Division, and Limuru Town, for Kiambu District, Central Province - Region 2; and finally,
c. Mebili Sub-location, Rotiani Location; or Narok Township, West Mau Division, for Narok District, Rift Valley Province - Region 3.
d. The nation-state of Kenya, which had to be selected from a range of unidentified national territorial outline maps of Kenya, Uganda, Zambia and Zimbabwe.

Appendices V.2.A; B:1 and 2; and C:1 and 2, pages 461-465, show the various territorial outline maps, which were unidentified during the experimental phase, from which the subjects had to select the correct territorial units, as required in the different tasks of the main criterion instrument (refer to Figures IV.2 and IV.12, pages 220, 221,

and 238, 239, respectively).

With reference to the problem of test reliability Stoltman (1971: 35) argued that it (reliability) is often regarded as the most revealing statistical index of the quality of any empirical test. According to Drever (1964: 246), while the term "reliability" refers, in a statistical sense, to the consistency of a test with itself, that is, the extent to which it can be assumed that the test will yield the same result if repeated a second time, the "reliability coefficient" is the measure of this consistency or the "coefficient of correlation" between two repetitions of the same test. Kerlinger (1973: 446-447) maintained that "reliability" has two equivalent definitions, namely that, it is:

a. the proportion of the "true" variance to the total obtained variance of the data yielded by a measuring instrument, which is a theoretical definition; and
b. the proportion of error variance to the total obtained variance yielded by a measuring instrument subtracted from 1.00, the index 1.00 indicating perfect reliability.

In equation form, these definitions are expressed thus:

a. $r_{tt} = \frac{V_\infty}{V_t}$ (which is theoretical and cannot be used for calculation); and

b. $r_{tt} = 1 - \frac{V_e}{V_t}$ or $r_{tt} = \frac{V_t - V_e}{V_t}$

where: "r_{tt}" is the reliability coefficient;
"V" is the total obtained variance or sum of squares, including systematic and error variances;
"t" stands for "total";
"∞" is the infinity sign and is used to signify "true";
"V_t" is the variance calculated from the obtained set of original scores, the X_t's, because the original scores contain error; and
"V_e" is the variance calculated from the obtained set of original scores with an "error" component (op.cit.446).

Hence, Stoltman (ibid.: 35-36), who tested 204 American school children from the State of Georgia, USA, computed total test and sub-test

reliability coefficients and standard errors of measurement for the TDT, using the Kuder-Richardson Formula 20 (KR_{20}). The results he obtained are shown in Table V.1 below:

TABLE V.1

KR_{20} RELIABILITY COEFFICIENTS AND STANDARD ERRORS*

(After Stoltman, 1971: 36)**

Test	# Items	KR_{20} Reliability	S.E. of Measurement
Total	60	.984	1.37
Behavioural	38	.962	.84
Explanation	22	.938	.55
Sub-test A(B)	10	.830	.23
Sub-test B(B)	9	.770	.18
Sub-test C(B)	9	.869	.26
Sub-test D(B)	10	.873	.27
Sub-test A(E)	3	.455	.07
Sub-test C(E)	9	.845	.24
Sub-test D(E)	10	.866	.27

* N = 204

** This information was supplied by J.P. Stoltman through personal communication.

The results of the split-half (odd-even) reliability coefficients which were computed for the TDT and for the 4 examiners who assisted Stoltman to collect data for the TDT are as quoted in Table V.2, below:

TABLE V.2

ODD-EVEN RELIABILITY COEFFICIENTS

(After Stoltman, 1971: 38)*

Test	Examiner	N	$Reliability_{oe}$
Total	All	204	.993
Behavioural	All	204	.987
Explanation	All	204	.983
Total	A	180	.993
Behavioural	A	180	.987
Explanation	A	180	.985
Total	B	6	.994
Behavioural	B	6	.987
Explanation	B	6	.973
Total	C	10	.990
Behavioural	C	10	.983
Explanation	C	10	.960
Total	D	8	.989
Behavioural	D	8	.988
Explanation	D	8	.968

* This information was obtained through personal communication with J.P. Stoltman.

The TDT, which was briefly outlined in Stoltman (1976b: 43-45)[2] consists of the following 4 Sub-tests:

Sub-test A: Verbal Territorial Identification:

This sub-test was designed to assess the subjects' verbal knowledge of the territorial titles, and to determine their (subjects') familiarity

with map representations of the territories concerned. As Stoltman (1971: 23; 1976b: 43-44) explained, the subjects' knowledge of the political title of the territory can be determined, without introducing the title first or facilitating recall by using the title, by asking such questions as "What is the name of the town or city you live in?". Or, as in the case of the present study, "Near which town do you live?". As shown above, answers given in response to these questions varied according to the local territorial situations in which the research was being conducted at any one given time.

In accordance with the instructions outlined in the TDT Manual, pages 3-4, three (3) sets of maps were prepared at the same scale, but offering enough variation so that the subject familiar with home district outline could recognise the shape of the map, as shown below:

a. For Item 4 (Sub-test A), outline maps of the subjects' home districts (Narok, Nairobi and Kiambu), and three (3) additional district maps as distracters (Kitui, Mandera and Isiolo) (see Appendix V.2.A, page 461);
b. For Item 7 (Sub-test A), the subjects' home provinces (Rift Valley, Central, and Nairobi), and three (3) other distracters (North Eastern, Coast, and Western) (see Appendix V.2.B.1 and 2, pages 462 -463, respectively;
d. For Item 10 (Sub-test A), the subjects' home nation's outline map (Kenya), and three (3) other distracters (Zambia, Uganda and Zimbabwe) (see Appendix V.2.B.1 and 2, pages 462-463, respectively).

All the maps used were simple outline ones with no information other than the shape of the territory. While the distracters used were legitimate rather than hypothetical territories, these distracters were germane to the local East African setting, including Zimbabwe which had just attained her political Independence. Appendix V.3.A, page 466, shows the items, directions and verbal instructions for Sub-test A.

Sub-test B: Verbal Territorial Relationship:

The purpose of this verbal sub-test was to determine the subjects' verbal conception of the relationship of one small territory of town X to, and inclusion within either the larger territories of either county X,

state X, or nation X, or any combination of these territorial units. Given the fact that the present study was carried out in the urban, semi-rural and remote rural regions of Kenya, emphasis was accordingly placed on the inclusion of such territorial units as village/sub-location, location, division, district or county, province, and then to the trading centres, towns and city in asking subjects to make their territorial responses. To disclose the verbal conception of the territorial relationships described above by using more rigorous sequences and standardised procedures than had been the case in prior studies, Stoltman (1971: 23-24; 1976b: 44) asked the following questions: "Where is town X?", and, immediately following an acceptable response, "Where else is town X?". He used the same questioning technique to obtain information about the territorial units of county, state and nation.

However, the pilot study that was undertaken by the present investigator revealed that some subjects found Stoltman's (1971, 1976) questions, which are shown in Appendix V.3.B, page 466, rather vague. This was so mainly because the questions did not specify the territorial units for which the responses were required. For example, a number of subjects gave such answers as "It is in Kenya", or "It is in East Africa, or Africa" to Question 1: "Where is Nairobi City/town or Kiambu town or Narok town?". Yet, these were not the specifically correct responses required. To reduce this vagueness, the present investigator devised the following additional questioning schedule for Sub-test B, which was concurrently used with Stoltman's (October, 1971) format, especially in those cases where the subject(s) failed to understand any of the original questions:

1. Is (name local town/city) in a district?

1.2 (If the response is incorrect) Have you heard of (local town/city)?

2. Is (name local town or city) also in a province?

2.2 (If the response is incorrect) Have you heard of (local province)?

3. Is (name local district) in a town or province?

3.2 (If the response is incorrect): Have you heard of (local district)?

4. Is (name local district) in a town or country/nation (Kenya)?

5. Is (name local province) in a district or nation?

5.2 (If the response is incorrect): Have you heard of (local province)?

6. Is (name local province) also in (name local territorial region (East Africa), and/or the world?

7. Name something (town, city, or district, etc.) that is/are part of your province.

8. In which country do you live? In which part/area/region (of Africa) is the country found?

8.2 (If response is "world" or totally incorrect) Have you heard of (name country/nation)?

9. Name something (for example, some of the territorial units named earlier: town/city, district, province, or world, etc.) that is/are part of (name country/nation).

In conformity with this additional questioning schedule, another Response and Score Form for Sub-test B was prepared so as to include the specific territorial units asked for in the questions. Thus, some of the correct responses expected were as follows:

1. Yes.
2. Tick "province".
3. Tick "province".
4. Tick either "province" or "nation/country".
5. Tick "nation/country (Kenya).
6. Write East Africa - ("World" is a doubtful response).
7. Accept "town" or "district" - (Nairobi can be accepted).
8. Kenya; tick East Africa (or Africa) - ("world" is a doubtful response).
9. All the territorial units of town/city, sub-location, location, division, district, province; "world" is an incorrect response - it was only included as a distracter. (See also Appendix V.3.B, page 466).

Sub-test C: Territorial Inclusion using Written Symbols:

This sub-test was designed to determine the presence, or absence, of logical territorial inclusion in the subjects' reasoning using a series of 9 standardised circles. Each of these circles measured 2½ cms (1 inch) in diameter ($1\frac{1}{4}$ cms or ½" in radius), and was drawn in the centre of a sheet which measured 11 cms by 14 cms ($4\frac{1}{4}$" by 5½"). Thus, each subject was given such a stapled 10-page Response Booklet, which formed part of the subject's TDT protocol, and was requested to complete the

background information questionnaire on the top page before the actual task was undertaken.

The procedure outlined below was followed in presenting this task to each of the subjects:

a. the investigator verbally identified the territory which the circle represented;
b. the subject was asked to draw a second circle on each of the pages of the booklet to show the territory named by the experimenter, and thereby help to disclose the territorial relationship the subject assigned the two circles by virtue of the placement of the second circle (behavioural response);
c. the subject was asked to justify verbally the placement of the second circle (explanation response); and
d. the investigator recorded <u>verbatim</u> the subject's explanation response.

Appendix V.3.C. page 467, outlines the items, directions, and verbal instructions used in Sub-test C.

<u>Sub-test D: Territorial Inclusion using Props</u>:

This last sub-test was designed to test the subjects' development of the concept of territorial relationships through the performance of several operations, and their ability to justify their decisions through the process of the manipulation and placement of the props. The materials used consisted of five (5) props, which were made out of card-board and were completely painted according to the specifications stated in the TDT Manual. These props, and the territorial units they represented, were:

i. <u>One</u> gold disc (2.22 cm or $\frac{7}{8}$" in diameter) for the subject's local town/city, sub-location or village;
ii. <u>One</u> tan or brown rectangle (3.81 x 5.08 cm or 1½" x 2") for the local district or county;
iii. <u>Two</u> white rectangles (6.35 x 8.89 cm or 2½" x 3½") for the local province or state, and the neighbouring province or state, respectively; and
iv. <u>One</u> black rectangle (20.32 x 25.4 cm or 8" x 10") for the nation/country.

As outlined in Appendix V.3.D, page 468, the presentation of this sub-test to the subjects followed the procedure shown below:

a. the investigator told the subject what each prop represented by political title (town, district, and so on);
b. the subject was then asked to manipulate the props into the correct territorial arrangements;
c. the subject was requested to justify the effected prop placement with a verbal explanation; and, finally,
d. the investigator recorded the positions which the subject assigned each of the props, and the explanation given to justify each of the prop-placements.

As shown in Table V.3, page 257 the content and task criteria of the TDT result in a four by four (4 x 4), sixteen (16) cell table of specifications. Further details of the TDT can be found in the Manual prepared by Stoltman (October, 1971).

TDT: Administration and Management of Materials

As far as possible, the TDT was administered individually by the investigator, in accordance with the specific instructions outlined in the Directions Form (Appendix V.3, pages 466 -468). Although the testing time allowed per subject is about twenty (20) minutes, the investigator adapted the general administration to suit the individual subject's speed of performance.

The 3 columns of the Directions Form (Appendix V.3.A-D) contain various pieces of information. While the first column shows the item number and the cell number in the table of specifications (Table V.3), the second column entitled "Directions" describes the item and necessary materials. The third column of Verbal Instructions provides the specific wording for each item, with variations for some of the sub-tests.

As shown in Appendix V.4, pages 469-470, the Response and Score Form has 4 columns for each sub-test. While the first column contains the item number, the second one shows the plausible responses and an "other" category for recording deviant responses. Columns three and four respectively allow spaces for a behavioural score and an explanation score.

TABLE V.3: TABLE OF SPECIFICATIONS FOR THE TDT (After Stoltman, 1971: 22)

Behaviour Dimension / Content Dimension	Verbal Territorial Identification (1)	Verbal Territorial Relationship (2)	Territorial Inclusion Using Written Symbols (3)	Territorial Inclusion Using Props (4)
1. City/Town	A. S names city/town he lives in or near. (1)	A. S says city/town in B. district; or says it is C. in nation. (2)	A. S places city/town in district; B. S places city/town in province. (2)	A. S puts city/town on district; B. S puts city/town on province. (3)
2. District	A. S indicates residence in district; B. S names district of residence; C. S identifies map outline of home district. (3)	A. S says district in province; B. S says district in nation. (2)	A. S places district in province; B. S places district to include city/town. (2)	A. S puts district on province; B. S puts district on nation. (3)
3. Province	A. S indicates residence in province; B. S names province of residence; C. S identifies map outline of home province. (3)	A. S says province in nation; or B. S says province in East Africa; or in C. S says it is in the world C. S says city/town or district is part of province. (3)	A. S places province in nation. (3)	A. S puts province on nation. (3)
4. Nation	A. S indicates residence in nation; B. S names nation of residence C. S identifies map outline of home nation. (3)	A. S says nation in E.A. or B. S says nation in world; C. S says city/town, or district, or province, part of the nation. (2)	A. S places nation to include province; B. S places nation to city/town; C S places nation to include district. (3)	A. S puts city/town, district, two provinces on nation in correct territorial order. (1)

In administering the TDT, the present investigator closely followed the instructions set out in the Manual. However, though the subjects were given a stapled response booklet for Sub-test C, instead of receiving one page at a time, they were not allowed to look back at the completed pages. This procedure proved more efficient than the one recommended in the Manual in organisational terms, as already explained.

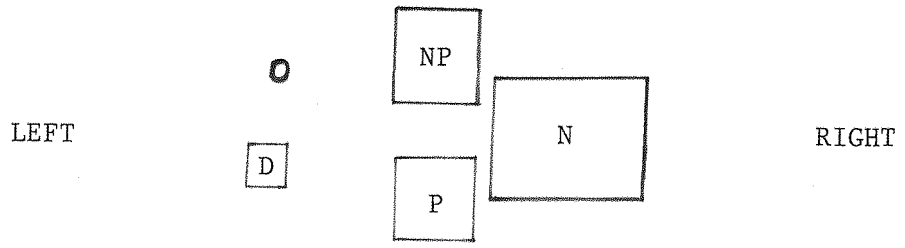
In Sub-test D, only the props the subject was required to manipulate were in direct view. In accordance with the instructions, the investigator introduced each question by arranging the props in such a way that the smaller of the two props was always on the left as the subject viewed them, or in such a way that the geometrical axes for the props were always, as shown in Figure V.1, page 259. In addition, the props in Item 6 of Sub-test D were arranged so that the subject viewed them from left to right as shown in Figure V.1, page 259. These props were identified in the following order: city/town, district, home province, neighbouring province and nation/country.

As required by the instructions in the TDT Manual, the investigator always repeated the question if a subject asked for a clarification, or if he/she failed to respond to a question. Thus, with the exception of Sub-test B, in which the present investigator introduced an additional questioning schedule, no attempt was made elsewhere to rephrase any of the questions in the TDT, or to reinforce the subjects' responses with such terms as "Right" or "Wrong". In all other cases, the instructions about questions and explanations as outlined in the TDT Manual, pages 6-7, were closely followed.

Procedures of Scoring the TDT

In the TDT, the correct responses were determined by the political title of the subjects' town (or any other locally germane territory: sub-location or location), district, province and nation of geographic proximity or residence. Only "Yes" and "Right" responses in Sub-test A were awarded credit. However, in this sub-test, the subjects who responded "Yes" to questions 3, 5, and 8, but did not know the name of the particular territory, were awarded item credit only if verbal evidence of residence was provided. For example, such an answer as: "Because

Figure V.1: Arrangement of the Props in Item 6, Sub-test D before the Subject (After Stoltman, October, 1971: 6)



KEY

O = City/town
D = District
P = Province
NP = Neighbouring Province
N = Nation

I go to school in this district" could be accepted as sufficient proof of correct knowledge of the territory. Explanation credit for the maps was awarded if the subject recognised the shape of the territory and related it to a map or globe observed elsewhere. However, neither behavioural nor explanation credit were given to Sub-test A map items when there was evidence to show that the subject's response was a guess.

In Sub-test B, the "other" category was not accepted as a correct response unless it was a semantic derivation of one of the satisfactory options listed. Credit for a listed option was granted only once with reference to a particular territory. Credit for Item 7 was awarded if any city/town or district, or province in Kenya was identified. No credit was given for the optional "Yes" and "No" responses, which were only included to introduce the subject to the titles of political territories concerned.

In Sub-test C, the correct responses were those illustrating the logical inclusion of territories. Thus, circles representing smaller territories (for example, towns) had to be enclosed rather than being juxtaposed to circles representing larger territories (for instance, districts). Correspondingly, an explanation credit was awarded for the correct expression of the territorial inclusion principle involved -

that is, for example: "Kiambu Township is in Kiambu District, and/or Kiambu Township is part of Kiambu District; Kiambu District is in Central Province; and "All these territorial units are found in Kenya, which is part of East Africa", and so on.

In Sub-test D, the correct behavioural responses were those illustrating correct territorial inclusion. As in Sub-test C, an explanation credit was awarded for an expression of the territorial inclusion principle. As outlined in the Instructions Manual, a subject who had correctly responded to all items in Sub-test C began with Item 6 in Sub-test D. Items 1-5 received credit when those props had been correctly placed in Item 6. From Item 6, the props had to be arranged thus to receive credit:

6 - city/town had to be on a district;
7 - district had to be beneath city/town, and on province;
8 - province had to be beneath district, beneath city/town, and on nation;
9 - neighbouring province had to be on nation; and
#10 - each smaller territory had to be on the appropriate next larger territory, and on the nation.

The exception to this scoring format was in the Nairobi Urban Region. In this case, the name "Nairobi" was accepted as a description of the town/city, province, and, in a few cases, the district. Nevertheless, subjects who gave local names of the administrative divisions of Nairobi, for example, Eastern Nairobi District (Makadara) or Nairobi Central, were also given credit for their responses.

The actual scores were awarded as follows:

a. For each correct behavioural response = One (1) point;
b. For each incorrect behavioural response = Zero (0);
c. For each correct explanation response = One (1) point;
d. For each incorrect explanation response = Zero (0).

Thus, the most successful subjects on the TDT attained a maximum score of 60 points, comprised of 38 behavioural points and 22 explanation points, respectively.

Assigning Territorial Decentration Stages (TDS)

As noted earlier, Piaget's and his associates' (1928, 1951) reports of research did not provide a quantifiable record of performance. To rectify this situation, Stoltman (October, 1971) took measures to incorporate in his TDT descriptive elements of those reports in the assignment of score ranges and criterion levels for the 4 sub-tests of the TDT. These procedures, which were also adopted in the present study, were outlined by Stoltman as quoted below at length:

> Territorial Decentration Stage I (TDS.I)
>
> A Sub-test A behavioural (B) score range between zero and three (0-3) was established as the Stage I inclusion level. That range includes children who do not have a verbal title at their disposal for any political territory in question. Piaget's reports do not specify that a zero score violates any basic premise for the stage. The belief is that all children older than 5 or 6 years of age recognise the title of their city/ town even if they are unable to recall the title.
>
> An explanation (E) score of zero or one (0-1) on Sub-test A is established for TDS.I. Young children may recognise maps but not recall the verbal title of the mapped territory. Such questions provide a recognition assessment of territories.
>
> A behavioural (B) score range between zero and two (0-2) on Sub-test B is indicative of minimum verbal territorial inclusion. Children's scores falling within that criterion range are assigned to TDS.I.
>
> Sub-tests C and D ranges for TDS.I inclusion are set between zero and two (0-2) for the behavioural (B) responses. A sub-test score within that range includes very elementary notions of the relationship of two territories.
>
> The explanation (E) ranges for Sub-tests C and D are established between zero and nine (0-9), and zero and ten (0-10), respectively. The verbal explanation that a smaller territory is within a larger territory is obtained from an early age. Such a response, however, is not complemented by a correct placement of props in their respective territorial arrangement. As a result, a greater explanation score may be obtained for some children (see Table V.4 below).

TABLE V.4

TERRITORIAL DECENTRATION STAGE I (TDS.I):
CRITERION RANGES

SUB-TEST	B	E
A	0-3	0-1
B	0-2	-
C	0-2	0-9
D	0-2	0-10

Note: The verbal explanation that a smaller territory is within a larger one is not complemented by a correct placement of props in their respective territorial arrangement.

Territorial Decentration Stage II (TDS.II):

T.D.S.II children command varying degrees of verbal information and, in some instances, complement prop placement with territorial inclusion principles. However, they do not synthesize their notions and knowledge of territories into any coherent system. Instead, their responses lack a systematic approach to considering the relationships of territories to one another. That lack of consistency is incorporated into the criterion ranges for TDS.II (see Table V.5, page 264).

Several additional considerations enter into the assignment of ranges for this stage. Those special considerations are intended to accommodate the variation in territorial relationships which Piaget reportedly observed. First, in Sub-tests C and D, the explanation (E) score must be equal to or greater than the behavioural (B) score. Also, the correct explanation (E) items on Sub-test C or D must be complemented by the corresponding, correct behavioural (B) items. Such behaviour and explanation score requirements on Sub-tests C and D accommodate the general variation of response patterns which Piaget attributed to the beginning of territorial decentration.

Second, if criterion ranges and behavioural (B) and explanation (E) item complementarity are attained on both Sub-tests C and D, and the criterion range attained on either Sub-test A or B, placement in TDS.II is justified even though the fourth sub-test score may not fit the criterion range. The latter exception permits the inclusion of children who perform below the criterion range on one of the non-prop sub-tests. The inclusion of those children is predicated upon Piaget's observation that matching prop and verbal responses are indicative of greater territorial decentration than verbal responses alone.

Territorial Decentration Stage III (TDS.III):

TDS.III indicates the child has developed the ability to territorially orient the geographical environment through verbalization and prop manipulation. Criterion scores for TDS.III indicate the synthesizing of territory in a manner comparable to adult standards. To attain the criterion level for TDS.III inclusion, the explanation (E) items of Sub-tests C and D must be equal to or greater than and complement the behaviour (B) items (see Table V.6 below).

TABLE V.5

TERRITORIAL DECENTRATION STAGE II (TDS.II): CRITERION RANGES

SUB-TEST	B	E
A	4-6	1
B	3-4	
C	3-6	≧B*
D	3-6	≧B*

Notes*
1. Correct explanation (E) items must complement the corresponding behavioural (B) items on Subtests C or D.
2. The explanation (E) scores must be equal to or greater than the behavioural (B) scores.
3. If criterion ranges, behavioural (B) and explanation (E) item complementarity are attained on both Sub-tests C and D, and the criterion range attained on either Sub-tests A or B, placement in Stage II is justified even though the score for Sub-test D may not fit the criterion range.

TABLE V.6

TERRITORIAL DECENTRATION STAGE III (TDS.III): CRITERION SCORES

SUB-TEST	B	E
A	7	2
B	5	
C	7	≧B*
D	7	≧B*

Notes*
1. Correct explanation (E) items must complement the corresponding behavioural (B) items on Sub-test C or D.
2. The explanation (E) score must be equal to or greater than, and must complement the behavioural (B) scores.
3. A S attaining a 100% criterion level on Sub-tests C and D (B and E items) is assigned to Stage III, regardless of scores on other sub-tests. This is "Optimum Decentration" (Piaget).
4. If the criterion score is attained on Sub-test D and two other sub-tests, assignment to Stage III is justified regardless of the score on Sub-test D.

Two other considerations are necessary regarding TDS.III inclusion. First, a child attaining a 100% criterion level on Sub-tests C and D (behavioural and explanation items) is assigned to TDS.III regardless of scores on the other sub-tests. Piaget regarded such complementary verbal and prop performance as optimum decentration. Second, if the criterion score is attained on Sub-test D and two other sub-tests, assignment to TDS.III is justified regardless of the score on the fourth sub-test. The Sub-test D criterion score requires an ability to territorially orient props on a one to one and on a one to four basis. That criterion level requires a more complicated arrangement than the one to one territorial relationships required in Sub-test C.

The emphasis upon criterion performance on Sub-tests C and/or D results from Piaget's observations that territorial decentration is contingent upon the complementarity of prop placement and verbal reasons exemplifying territorial inclusion principles. The researcher (Stoltman, 1971) regarded such complementarity at the seventy percent (70%) criterion level on Sub-tests C and/or D to indicate adequate stability in behaviour and explanation responses. The failure to attain the appropriate criterion range or score, or any of the previously stated combinations, requires assignment to the next lower territorial stage (Stoltman, October, 1971: 10-14).

V.3.2 The Three Mountains Co-ordination of Perspectives Test

As discussed in Chapter III.7, pages 151 -153, one of the aspects upon which the present research focusses attention is an examination of the relative influence of the level of space concept development, or the effectiveness of spatial judgment, of the subjects upon their development of territorial decentration.

The "Three Mountains Co-ordination of Perspectives Test", or what is also called the "Space Concept Development Test" (SCDT), which is one of Piaget's classical spatial tasks, was selected for use in this study from a range of criterion tasks.[3] This task was originally designed by Piaget and Inhelder (1956: 209-246), and was later standardised for use in cross-cultural investigations by Laurendeau and Pinard (1970: 310-320, 452-457.[4] The latter version was therefore adopted because

FIGURE V.2.1 and 2

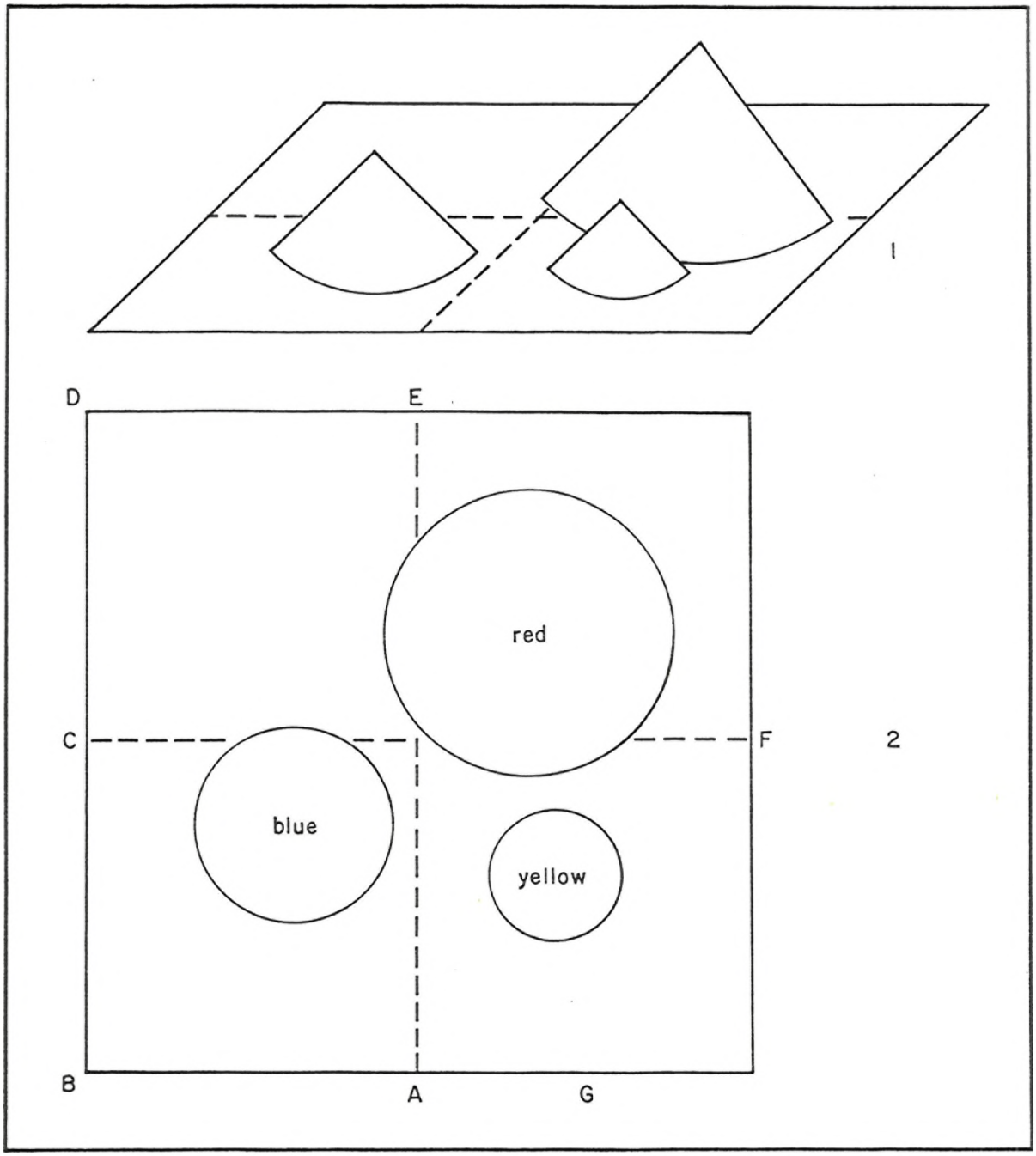


Fig. V.2: The experimental material used in the *Three Mountains Coordination of Perspectives Test*. The three cones are seen from the front in 1 and from above in 2. The letters indicate the positions at which the small man/woman is successively placed (F, C, B) and the various perspectives corresponding to pictures: A, B, C, D, E, F, G reproduced in Fig. V.3. (After Piaget and Inhelder, 1956 and Laurendeau and Pinard, 1970.)

of its standardised procedures and general relevance to the rest of the criteria under present investigation. Describing the test, Laurendeau and Pinard, op.cit., maintained that it

> .....requires co-ordinating several objects in relation to a single observer occupying several successive positions, or to several observers placed in different locations. It requires (the subject) also to co-ordinate the relative positions of several objects among themselves and of each of these objects in relation to a mobile observer (or several immobile, but variously located, observers). As Piaget notes....., this difference implies systematising the projective left-right, before-behind, and so on, relations with respect to an observer without the randomness which characterises the use of such concepts in purely topological contexts as, for example, when it is a question of differentiating the two directions of a linear sequence. Furthermore, this difference requires that a general system be constructed to include the numerous possible viewpoints, precisely because the co-ordinations to be made concern several objects and several imaginary observers simultaneously. (See pages 311-312).

SCDT: Materials and Administration Procedures

Appendix V.5.A, page 471, describes the materials used for the SCDT, which consisted of the following items[5]:

a. Three cones of thin cardboard, representing mountains: one red one (20 cm in diameter, and 11.5 cm in height); one blue one (14 cm in diameter, and 75 cm in height); and one yellow one (9 cm in diameter, and 5 cm in height) (see Figure V.2.1, page 266).

b. One piece of green cardboard (52 x 52 cm), on which three circles showing the relative positions of the cones were marked, and whose square base was divided into 4 smaller sections of equal size (26 cm on a side) by thick black lines (see also Figure V.2.2; page 266);

d. Nine cards (14 x 18 cm), on each of which was drawn the three representative cones from various spatial perspectives, as seen from A, B, C, D, E, F, G, (H and I). The cones occupied fixed positions on the green cardboard which was placed on a table during experimentation. The pictures on Cards H and I were dummy ones since they represented impossible views of the configuration as the mountains/houses had moved around. See

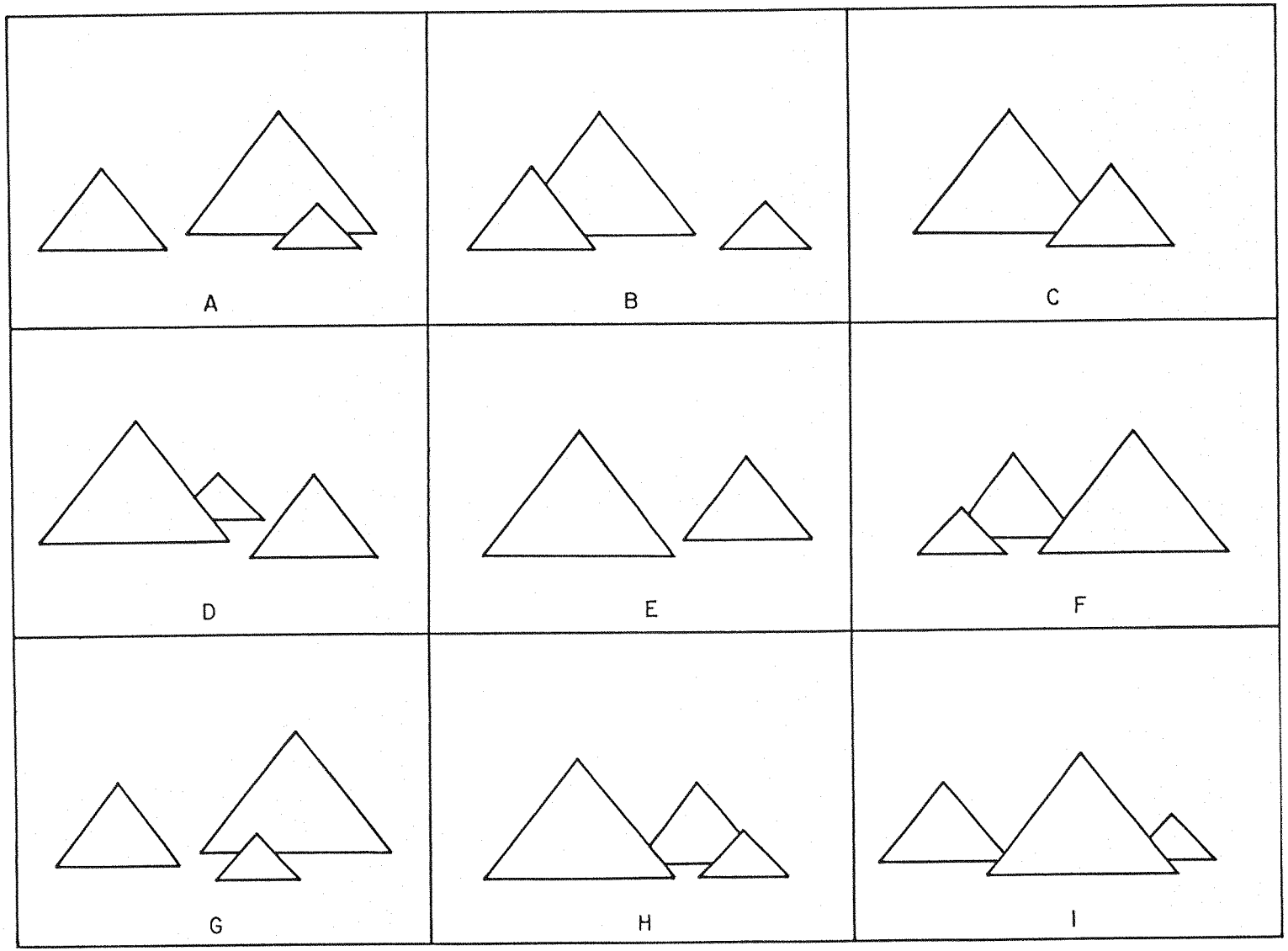


Fig. V.3: The set of nine pictures, showing various perspectives from which the subject chooses in the *Three Mountains Coordination of Perspectives Test.*

(After Piaget and Inhelder, 1956; and Laurendeau and Pinard, 1970.)

FIGURE V.3

Figure V.3, page 268; and

d. One small man/woman or doll made of modelling clay with a maximum height of 3 cm.

As with the rest of the experimental tasks, the SCDT was administered in a well-lit and ventilated class-room that had been designated the "Research Room" in each of the participating schools. The subject and the investigator sat opposite each other with a low table between them. The materials described above were placed on top of the table. From the subject's perspective, the blue mountain (Mt. Kenya) could be seen at his left, the yellow mountain (Mt. Suswa) at his right, and the red mountain (Mt. Longonot), partly hidden by the yellow mountain, could be seen at his right. The nine outline pictures (cards) were labelled as A, B, C, D, E, F, G, H, and I. As noted earlier, H and I were the impossible views of the configuration.

During the familiarisation session, which preceded the main testing phase, the subject was introduced to the materials and the procedures that were due to be used in the test. The subject was helped to identify the colours and sizes of the "mountains", using the local names shown above, and was shown the small clay man or woman model that was going to walk around the configuration, stopping at different points to get better views of the mountains to take photographs. The subject was informed that his task was to recognise, from a range of pictures, the picture that represented the view the doll was experiencing wherever he/she was placed around the configuration. Pictures A and D were used for training purposes, and the subject had to choose Card A for the doll at position A to show that he/she had understood the demands of the task. To focus the subject's attention to the analysis of the visual stimulus situation during the familiarisation session, use of such depth cues and relational terms as "Mt. Suswa being in front of Mt. Kenya", and "both of these mountains being to the right of Mt. Longonot, from which they were separated by a gap", was emphasised.

The SCDT had two main parts. Part I, in which the subject had to recognise the relevant picture cards representing what the man/woman could see from various positions, and to justify the choices made, had 3 problems, as described in Appendix V.5.A, pages 471-475. Part II

had 5 placement problems. In this section, the subject was seated at A, and was presented with picture cards C, F, B, E, and I, one at a time. At each time of presentation, the subject was asked to place the man/woman at a position where the mountains could be seen exactly as they appeared in the picture card presented. The subject had then to justify each of the response placements made (for details, see Appendix V.5.A, pages 474-475). On average, each subject took 20 minutes to complete this task.

SCDT: Recording and Scoring Procedures

Since performance in the SCDT can be evaluated in terms of correct responses, types of errors and stages of space concept development, the responses and comments of explanation made by each subject in the research were recorded on the "Response Record Sheet" or the "Subject's Protocol" (see Appendix V.5.B, page 476).

For purposes of the present investigation, attention was focussed on the correct responses made, and the stages attained, by the research subjects. Thus, the scoring procedure was divided into 3 levels, as shown in Appendix V.5.B, page 476. In the first level of scoring of Part I, each subject was given a score for the correct selection of the picture card representing the man's/woman's view, there rejecting all other picture cards and counter-suggestions. The possible sub-total score for this part was 3. In Part II, which had a possible sub-total score of 5 the subject was given a score for placing the doll at a position corresponding to that depicted in a given picture card for the first 4 problems; and for the fifth, the subject got a score for stating correctly that the picture was representing an impossible view. This resulted in a possible SCDT total score of 8.

At the second level, the responses were scored in terms of the Piagetian stages of the development of mental operations as they relate to spatial sophistication. Following the procedures used by Piaget and Inhelder (1956: 209-246) in general, and by Laurendeau and Pinard (1970: 344-403) in particular, space concept development stages (SCDSs) were determined from the scores obtained by the subjects in Part I of the test, as shown in Appendix V.5.B, page 476, and Table V.7, page 271.

TABLE V.7

CRITERIA FOR ASSIGNING SPACE CONCEPT DEVELOPMENT STAGES*
(After Piaget and Inhelder, 1956: 209-246; and Laurendeau and Pinard, 1970: 344-403)

Stage Attained	Characteristic Responses and Behaviour
0	Total Incomprehension or refusal to respond.
1	Complete Egocentrism or Egocentricity:
1A	Overt egocentrism or egocentricity - choice of picture cards representing one's own perspective irrespective of the doll's position;
1B	Pseudo decentration - some evidence of comprehension; but responses are still incorrect.
2	Partial Decentration:
2A	No, or one, successful response out of 3 is recorded; most of the responses are egocentric - subject chooses picture cards close to his position and/or cannot stand the test of counter-suggestion or cannot give adequate explanation for his choice, even when the choice is correct;
2B	Success on 2 out of 3 problems; partial or absolute failure on the third problem; and failure to justify responses made.
3	Total Operational Co-ordination of Perspectives: Attainment of complete decentration, when all the 3 choices made are correct, and the explanations offered are justifiably sound.

* These stages are assigned according to the scores obtained in Part I of the SCDT.

V.3.3 The Portable Rod-and-Frame Test (PRFT)

It was shown in Chapter III.8, pages 153-156, that one of the secondary aims of this study is to examine the relationship between the FD-FI cognitive style dimension of psychological differentiation and the development of territorial decentration amongst a sample of Kenyan African

school pupils. Thus, Oltman's (1968) portable version of the Rod-and-Frame Test, which was originally developed by Witkin (1950), and used later by Witkin *et al*. (1954/72), and Witkin *et al*. (1962/74), was selected for use in the present study to determine, in operational terms, the subjects' standing, on the above-named FD-FI dimension. The vertical portable RFT apparatus (Model V-1260-A), which is of table-top size, does not require a dark room and constitutes a valid test of the FD-FI dimension, was constructed by Oltman (*op.cit*.: 503) to avoid the inconveniences associated with the original RFT. Oltman's version of the RFT has the following advantages: the portability of the apparatus makes it practical for use in the various experimental school situations, testing time is greatly reduced since no dark-adaptation period is required, and elimination of the need for a dark-room makes testing easier for those subjects who might become anxious in the dark (see Oltman, *ibid*.: 506).

Description of the Vertical PRFT Apparatus

The apparatus used in the present study had been acquired in 1978 by the BER, KUC, on the recommendation of P.R. Dasen, who wanted to use it in his research. The PRFT apparatus was described thus by Oltman:

> ....A headrest is placed at one end of a rectangular enclosure which serves as the frame, and which can be tilted to the left or right at an angle of 28°. The walls of the enclosure are of translucent plastic, and the tilting rod is visible at the end of the enclosure opposite the head-rest. The S's field of view is restricted to the interior of the enclosure by means of a curved shield which is attached to the head-rest. Between trials, a curtain is raised in front of the S's face to block completely his view of the inside of the enclosure.
>
> The base (60.96 x 91.44 cm or 24 x 36 in.) and the disc (55.88 cm or 22 in. in diameter) forming the ends of the enclosure are of 1.905 cm or 3/4-in. plywood. The sides of the enclosure are of 30.48-X 60.96-X 0.318-cm or 12-X 24-X 1/8-in. white acrylic plastic sheets, with matte finish on one side, and are assembled with aluminium corner mouldings so that the dull surfaces of the sheets are on the inside of the enclosure. On the inside of the end of opposite, the head-rest a frame is framed by affixing black plastic strips so that they extend 0.953 cm or 3/8 in. beyond each edge. The enclosure rests on rollers in such a way that it

> can tilt smoothly to either side. The head-rest.... is an aluminium casting.... The shield.... is made of a U-shaped piece of flexible white polyethylene sheet placed so that the visual field is restricted to the interior of the apparatus. The curtain is made of black velveteen attached to a curved wire loop which pivots on the head-rest so as to pass from under the shield to a point above the S's field of view when an attached handle is turned. The rod is visible at the opposite end of the enclosure of 1.905-cm or 3/4-in. plywood which has a matte white surface and which rotates on the same axis as the enclosure. On the back of the latter disc are fixed a protractor and level so that deviations from the vertical can be read. To provide for sufficient accuracy in reading, the scale of a small precision protractor was photographically enlarged to a radius of 25.67 cm or 10½ in.... In general, the apparatus was constructed so that no marks, screw-heads, or other irregularities appear on the inside of the enclosure or on the back frame which surrounds the rod, so that no cues are available to the S which might make his responses artificially consistent (ibid.: 503-505).

The PRFT Administration and Scoring Procedures

In the present research, the "research room" used for the rest of the experimental tasks was also used for administering the PRFT to the subjects, as shown in detail in Appendix V.6.A, pages 477-480. Briefly, the procedure and instructions were described by Oltman as follows:

> With the curtain closed...., the S was told that the purpose of the test was to determine how well he could establish the upright (vertical) under various conditions. "Vertical" was carefully defined as corresponding to the gravitational vertical (for example, a vertical flagpole). He was told that when the curtain was opened...., he would see a square frame and a rod which could be tilted to either side by the experimenter (E), either singly or together, to the same side or to opposite sides. He was told that the rod was to be made vertical, and, after opening the curtain, the E turned the rod in 3° steps as instructed by the S until the S indicated that the rod was upright. The curtain was closed between trials, and the S was cautioned not to remove his head from the head-rest at any time during the test. Eight (8) trials (9 in the present research, which included the ninth "control trial") were given on each PRFT apparatus, with frame and initial rod tilts of 28° in the following sequence: frame, LLRRLLRR; rod, LRRLLRRL. (For the control frame, the frame was at 0° and the rod at 28L or 242°) (ibid.: 505, and Appendix V.6.A).

On average, each subject took 15-20 minutes to complete this task.

Oltman (1968), who tested 163 American college students (83 females, 80 males), reported that, in comparative terms, while scores on PRFT correlated .89 with scores on the standard RFT version (.89 for females, .90 for males), Spearman-Brown split-half reliabilities were .95 for PRFT apparatus and .96 for the standard version. Correlations between the Embedded Figures Test (EFT) and the two types of RFT did not differ significantly (.60 for PRFT apparatus and .56 for the standard version). (Oltman, ibid.: 505).

The score for each subject is the sum of the absolute deviations from the vertical over the 8 trials given. Therefore, the higher the sum, the more field-dependent the subject is, and vice versa. As noted earlier, a ninth "control trial" was included in the present study to act as a check on task comprehension and error of adjusting the rod with the frame horizontal (see Appendix V.6.A). In this case, deviations were normally expected to be within the -2° to +2° range. This deviation was, therefore, recorded as a "Control Deviation (CD)" score aside the total for the 8 trials. Appendix V.6.B, page 481, shows the format used to record the subjects' performance on PRFT (reference can also be made to Oltman, ibid.: 505-506; and Wober, 1967, who used the standard version). In interpreting PRFT scores, it is noteworthy that 'there is no a priori degree of deviation which defines a FD or FI subject, but a dimension, that is, more or less FD or FI. For statistical purposes, one can use correlation, without having to set a limit, and possibly classify the subjects into FD, FI and Intermediate categories' (Dasen, personal communication: 1980). For the present study, however, Oltman's method of computing means and standard deviations for PRFT scores will be adopted (see Oltman, ibid.: 506).

V.3.4 The Class Inclusion Test (CIT)

The discussion undertaken in Chapter III.9, pages 156 -157, led to a general prediction that the operational logical class inclusion (intellectual) ability of the subjects interviewed in the present study is expected to be so related to their performance on the TDT that the majority of those achieving correct sub-class and class inclusion

relations would also attain TDS.3, and vice versa. Furthermore, it was noted that Sub-tests C and D of the TDT require subjects to make responses on Territorial Inclusion, using, respectively, written symbols and props. Nevertheless, it was considered necessary to determine, independently, the present research subjects' logical understanding of the relations of subclasses to overall classes in the class inclusion system by using items that are different from the territorial units and props directly employed in the TDT.

A version of the Class Inclusion Test (CIT), using animals, (see Inhelder and Piaget 1964, Opper: 1971, 1977; Dasen and Ngini, 1978; and Otaala, 1973), was selected for application in the present study. The short pilot study undertaken within the 3 research regions revealed that about 95 per cent of the Kenyan African pupils interviewed then were more familiar with the representative miniature classes of animals (cows, sheep, and goats) than they were with such other items as flowers and fruits which had been used by some of the above-named investigators. Hence, the decision to use the classes of animals in the present research.

CIT: Materials, Administration and Scoring Procedures

As described in Appendix V.7.A, pages 482-484, the materials used in the present study consisted of groups of miniature or toy domestic animals, 10 in each group, to represent cows, goats, and sheep; a model/doll of a man and a woman, who represented the animal herder/keeper; and two hard cardboard sheets (18 x 18 cm), which were respectively marked in the right-hand corner thus: "SET 1" and "SET 2", and were required for use in Part II of the test. During the task administration phase, the materials were laid on the table and within easy reach of the subject. The experimenter sat opposite the subject, and the course of the interview, which lasted about 10-15 minutes per subject, followed the format of procedural instructions outlined in Parts I and II of the task.

Part I of the test consisted of 4 questions, each of which involved the use of one set of animals. In this part of the task, the experimenter arranged a group of different sub-classes of animals, and then asked the subject to give his/her herdsperson either more or fewer animals,

cows, sheep, and so on. A number of possible modification items were included soon after Part I for use if and when any of the subjects either failed to respond or displayed lack of task comprehension. Part II was divided into two sub-sections (4 in Sub-section 1, and 2 in Sub-section 2). The questions required the subject to observe different sets and sub-sets of animals put on each one of the two cardboard sheets, and to respond to the questions asked by the experimenter (see Appendix V.7.A, pages 483 -484).

As shown in the Response and Score Record Sheet (Appendix V.7.B, page 485), a subject was awarded one score for each correct response made, which was indicated by encircling the "+" symbol, and a zero (o) for each incorrect response made, which was indicated by encircling the "-" symbol. While the maximum total correct score for the CIT was 10, all the correct and incorrect total scores obtained by each subject were recorded.

V.4 Summary

This fifth chapter has dealt with the process of instrumentation through which data for the present research were collected. Thus, descriptions of the following elements were undertaken: background questionnaire and interview schedule; procedures for selecting the research instruments; specific tasks and materials used to operationalise the experimental criteria under present investigation; and procedures for administering and scoring each of the experimental tasks. The four tasks thus described were the: TDT, which was the main criterion instrument for this research, and has 4 Sub-tests, Three Mountains Co-ordination of Perspectives Test (or SCDT), PRFT and CIT. Chapter VI will, therefore, concentrate on the presentation, analysis and interpretation of the experimental results obtained from administering the above-named tasks to subjects of this research.

V.5 Notes and References

1. See Appendices II.5.A-C, pages 444-446.

2. The details of this instrument are set out in the Revised Edition of the Manual for the TDT (October, 1971), which was sent to the present investigator, by Professor J.P. Stoltman, who also gave his permission for its use in this research (see also Appendix II.5.B, page 445).

3. The range of tasks studied included:
   a. the "(Newcastle) Spatial Test 3 (NFER Test 125)", developed by MacFarlane Smith, I., and Lawes, J.S. (1959), was not adopted because it was 'intended for use in connection with the allocation of pupils to technical courses', an aspect with which this study was not specifically concerned. This test and the accompanying Manual of Instructions were obtained from the Test Manager, NFER, Windsor, Berkshire, England, and the present investigator is grateful for the Manager's co-operation;
   b. the "Localisation of Topographical Positions Test", developed by Piaget and Inhelder (1956: 419-446) and was standardised and used by Laurendeau and Pinard (1970: 181-245). Though this task had been used by Dasen for his investigations in Australia (1970) and in Kenya (1977-78), and while it could have been appropriate for use in this study, the present investigator adopted Piaget's Three Mountains Co-ordination of Perspectives Test (SCDT) which, it was felt, would give better indication of the subjects' development of concepts of spatial perspective.

4. This Three Mountains Co-ordination of Perspectives Test had also been used by Omari (1977) in his study entitled "Cognitive egocentrism: Age and environmental variables in spatial decentration among Tanzanian children".

5. Through personal communication with P.R. Dasen, the present writer was informed that Vinh Bang, who is another researcher based in Geneva, had produced new materials and standardised procedures for use in the Co-ordination of Perspectives Test. The materials referred to are of different shapes, sizes and colours (for example, a mountain, a church with a cross, and an ordinary house) instead of the cones used in the present study. It was, however, not possible to adopt Vinh Bang's version because its details had not yet been published.

CHAPTER VI

PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION OF THE RESULTS IN RELATION TO THE RESEARCH HYPOTHESES

VI.0 Introduction

The preceding chapter described the process and procedures of instrumentation through which empirical data for the present research were collected. Consequently, this sixth chapter will deal with the following aspects:

a. the presentation, analysis, interpretation and discussion of the results obtained from administering the main criterion instrument (TDT) and the rest of the tasks which were used to operationalise the variables under present investigation. Thus, such descriptive statistics as frequencies, percentages, means and standard deviations of the test results, and of the various stages of attainment by the research subjects, will be presented, wherever possible, in tabulated and/or graphical form, and examined; and

b. the testing of the nine (9) a priori research hypotheses which were set up in Chapter III. This process will involve the use of a number of statistical techniques.

The findings arising from these descriptive and analytical attempts will form the bases upon which conclusions about the various research aspects under present investigation will be drawn.

VI.1 Presentation, Descriptive Statistical Analysis, Interpretation and Discussion of the Experimental Results

VI.1.1 Additional Tabulated Information About Certain Distributional Aspects of the Research Sample

Further to the description and stratification of the background variables of the present research population and sample in Chapter IV.3.2. a-c, pages 199-214, additional information about certain distributional aspects of the 270 subjects who participated in this study is provided below in order to facilitate understanding of the descriptive statistical analysis of the experimental results.

Table VI.1, page 314, presents the distribution of all the 270 subjects in the sample according to sex, age and regions of residence. It is noteworthy that while Region 1 (Nairobi) had the greatest number of subjects in the age groups of 11 years (11 boys and 7 girls), Regions 2 (Kiambu) and 3 (Narok) had only one (1) subject each in this age group. At the other end of the age continuum, whereas Region 1 did not have any subjects aged 17 years and above, both Regions 2 and 3 had subjects in these age groups. Of the four subjects in the 20-year age group, while one (1) boy came from Region 2, two (2) boys and one (1) girl were drawn from Region 3. On the whole, therefore, whereas Regions 2 and 3 had subjects in each of the age groups (11 to 20), those in Region 1 were all concentrated in the 11 to 16 age groups. As explained earlier, it was not possible to obtain equal numbers of similarly-aged subjects for all the age groups and regions.

The numbers and percentages of all the 270 subjects, as distributed according to age and regions of residence, are shown in Table VI.2, page 315. The data in this table help to emphasise, even more clearly, the points made in the preceding paragraph. Overall, however, whereas each of the groups 14 and 16 had the largest number of subjects (52 or 19.2 per cent each), age group 19 had only 3 (1.11 per cent).

As shown in Table VI.1, page 314, the numbers of subjects in some of the individual age categories were too small for individual statistical processing (see, for example, the numbers in age categories 18, 19 and 20). It was therefore decided to re-group the individual age categories into the following three (3) "age-group" categories: 11 to 13, 14 to 15 and 16 to 20. Consequently, Table VI.3, page 316, presents the distribution of all the subjects in the sample according to the 3 age-group categories, sex and regions of residence. As the table shows, while Region 1 had the largest number of subjects in the 11 to 13 age-group (that is, 47 out of a total of 82), Region 3 had the smallest number in this category (only 13), and Region 2 took the intermediate position, with 22 subjects. On the other hand, while Region 3 had the largest number of subjects in the 16 to 20 age-group category (that is, 49 out of a total of 105), it was followed by Region 2, which had 33 subjects, with Region 3 having the smallest number of subjects (23) in this category. Within the 14 to 15 age-group category, the major

difference in numbers was between Region 2, which had 35 out of the total of 83, and Region 1, which had only 20 subjects; Region 3 had 28 subjects in this category.

With reference to the sex differences as portrayed by the distribution of subjects in Table VI.3, it is noteworthy that while the smallest number of girls (3) was found within the 14 to 15 age-group category of Region 1, that of the boys (3) was found within the 11 to 13 age-group of Region 3. On the other hand, whereas the greatest number of girls (29) in the sample is found within the 11 to 13 age-group category of Region 1, that of the boys (28) was drawn from the 16 to 20 age-group category of Region 3.

VI.1.2 Descriptive Statistics for the Variables Studied in the Research

The SPSS Programme: Release 8.1[2] was run on Southampton University's ICL 2970 Computer to perform the necessary statistical analyses of the raw scores which were obtained by the subjects from the TDT and the rest of the tasks used in the present research. Table VI.4, page 317, shows a summary of the descriptive statistics obtained from the above-named treatment. Concurrent reference to the relevant descriptive outlines which were offered for each of the research measures in Chapter V is essential to ensure an understanding of the trends in the data presented in Table VI.4.

Upon inspection, the data in Table VI.4 seem to show a general tendency towards negative skewness, that is, while the mode is greater than the median, the latter (median) is greater than the mean. The important implication of this finding is that there were more observations in the sample which had high scores, and vice versa, for all the measures concerned. The clear exception to this rule, however, is the PRFT, for which a different interpretation is advanced below.

As was noted in Chapter V.3.3, pages 271 - 274, for the PRFT, the score of zero (0) is indicative of "best" performance. Thus, a score of one (1) is slightly better than, for example, a score of three (3) and so on. Explained in operational terms, the lower the sum of scores attained on PRFT, the more field-independent (FI) is the subject on the FD-FI dimension, and vice versa. This helps to explain the mode of zero

(0) which was recorded for PRFTR, PRFTL and CD. As noted above, the data presented in Table VI.4 show a general tendency towards positive skewness for all the elements of the PRFT, in contrast to what was found for the rest of the measures. This indicates that a greater number of observations had low scores in the PRFT. Thus, the majority of subjects studied in this research were observed to be field-independent.

In line with some of the previous related studies which were discussed at length in Chapter II.4, pages 69-100 ,the performance of the subjects on the present investigation's main criterion instrument, the TDT, was examined in terms of the stages of territorial decentration (TDSs.) attained, as shown below.

Whereas Table VI.5, page 318 , presents the numbers of Kenyan subjects classified in each of the three (3) TDSs by age, sex and region, and Table VI.6, page 319, gives the numbers and percentages of all subjects classified in each TDS by sex and age, Figure VI.1.A-C, page 320 , which is based on data presented in Appendix VI.1, page 486, illustrates the percentages of subjects in Regions 1, 2 and 3 as they were classified in TDS. II and III by age. Figure VI.2.A-B, page 321 , which is based on data shown in Appendix VI.2, page 487 , illustrates the subjects' attainment of TDSs. II and III by age. While Figures VI.3.A.i-iii, page 322 , and VI.3.B.i-iii, page 323, which are both based on Appendix VI.3, page 488, show graphically the percentages of subjects classified in TDSs. II and III by age, sex and region, Figure VI.3.C.i-ii, page 324 , which is based on data presented in Table VI.6, page 319 , shows the percentages of subjects who attained TDSs. II and III by sex and age. Table VI.7, page 325 , presents the numbers and percentages of the subjects who attained the formal operational level of subjects' performance, TDS. III, by age and region. Finally, the percentage attainment of TDS.III by age-group categories is illustrated graphically in Figure VI.4, page 324, which was based on data presented in Appendix VI.4, page 489.

Although further discussion of several of the points arising from the results presented so far will be undertaken later in this chapter, a number of general comments can be made at this stage about the data shown in the tables and figures. Firstly, only one (1) female subject,

who was aged 11 years and came from Region 3 (Narok), was classified in TDS.I. This subject and TDS.I were, therefore, excluded from most of the subsequent statistical analyses of the research data. Secondly, with exception of only one (1) 17-year-old female subject from Region 3, who attained TDS.II, all the subjects in the sample who were aged 17 years and above attained TDS.III. However, it may be recalled that Region 1 (Nairobi) had no subjects in these age ranges, as shown in Tables VI.1 and 2. Thirdly, while no subject aged 16 years and above in Region 2 (Kiambu) was classified in TDS.II, three (3) female subjects, who were respectively aged 16 and 17 years, attained this stage in Region 3. Fourthly, none of the male subjects in Region 3 were classified in TDS.II, as shown in Table VI.6 and Figure VI.3.A.iii. Lastly, all the four (100 percent) 20-year-old subjects in the research sample attained TDS.III.

VI.2 Testing of the Research Hypotheses through Quantitative Analysis of the Results

To test the various a priori hypotheses set up in Chapter III of this thesis, the research data were subjected to quantitative analysis using a variety of statistical techniques. In the first instance, therefore, hypotheses 1 to 6, which were based on such categorical data as age-groups, sex, grades, regions of residence, PEERE and SESP, were tested using Chi-squared tests.[1] The results of these analyses are described and discussed in Sections VI.2.A.1-6 of this chapter. Secondly, the techniques of simple correlation and stepwise regression analyses were applied to such numerical data as the age of the subjects and their scores on the SCDT, PRFT, CIT and TDT to test hypotheses 2, 7, 8 and 9. Again, the SPSS Programme: Release 8.1 was run on the computer to perform most of these analyses, with the results presented and discussed in Sections VI.2.B.1-4 of this chapter.

VI.2.A Chi-squared Tests of the Research Data

2.A.1 The Relationship between Piaget's (1928, 1951) Spatial Stages and the Stages and Rates of the Development of Territorial Decentration (DTD) in a Sample of Kenyan African Children

As was discussed at length in Chapter III.1, one of the major concerns

of this study was to investigate the applicability of Piaget's (1928, 1951) Spatial Stages to the qualitative aspects (that is, the stages and rates) of the development of territorial decentration (DTD) in a sample of Kenyan African children. It will also be recalled that a modified version of Stoltman's (1971, 1976a) Model of Hypothetical Distribution of Piaget's Spatial Stages (Table III.3, page 132) was adopted for use in the present study to facilitate the testing of the first hypothesis, as will be shown below.

Table VI.8, page 326 , presents the age frequency distributions which were actually observed from the present research for Age-Stage Fits A, B and C according to Piaget's Spatial Stages, as based on the above-named hypothetical model. The estimated percentages of the age frequency distributions in each age-group category, whose calculation was based on data presented in Tables III.3 and VI.8, are shown in Table VI.9, page 327 .

To test the first hypothesis, Chi-squared test analyses were performed on the present research data. This was done to determine the Goodness-of-Fit between, on the one hand, the expected frequencies which were stipulated according to the above-described hypothetical model (Table III.3), and, on the other, the observed age and TDS frequencies. The Chi-squared matrices which were prepared and the probabilities of correspondence or independence of the observed and expected distributions which were determined are all presented in Table VI.10, page 328 .

The differences between the age ranges of the subjects interviewed in the previous related studies and those of the present research were noted and discussed in Chapter III.1. Despite these differences, it was considered necessary to determine how far the rates at which the Kenyan African subjects attained the various TDSs were identical to, or different from, those observed amongst the samples of approximately similarly-aged Swiss and American children studied by Piaget (1928, 1951) and Stoltman (1971, 1976a) respectively Table VI.11, page 329 , therefore, presents a comparison of the results of the Chi-squared test analyses which were performed to determine the probability or extent of correspondence between the two selected equivalent percentage Age-Stage Frequency Distributions C.3 for the American sample and A.1

for the present Kenyan sample, as calculated for TDSs. II and III.

There are several major points which can be noted from an examination of the data presented in the tables and described in the foregoing paragraphs. Firstly, the attainment of the various TDSs. in the sample of Kenyan African children seems to be taking place at substantially greater chronological ages than in the samples of Swiss, American and Brazilian children who were respectively studied by Piaget (1928, 1951), Stoltman (1971, 1976a) and Oliviera (1976) (see Tables III.3, VI.8, 9 and 10).

Secondly, the present sample of Kenyan children were, on the whole, observed to be entering the TDSs. or Piaget's Spatial Stages at ages earlier than those predicted in Stoltman's (1971, 1976a) hypothetical model (Table III.3). In comparative terms, therefore, this present observation is not only contrary to the hypothetical predictions made in the above-named model (Table VI.10), but it also seems to call into question the validity of the model's timing when applied to such an African sample as the present Kenyan one.

Thirdly, the results presented in Table VI.11 show that the Kenyan subjects, who were aged between 11.0 and 12.11 years, attained TDS.III earlier than the approximately similarly-aged American children studied by Stoltman (1971, 1976a) but not so soon as the Swiss subjects studied by Piaget, ibid. Thus, whereas the expected frequency for TDS.III for Age-Stage Fit A.1 in the 11.0 to 12+ age-group range of the present research was 10 percent, the observed frequency was 56.6 percent. In sharp contrast to the above, Stoltman's (1971, 1976a) observed frequency for the same TDS.III for his Age-Stage Fit C in the 10.7 to 12+ age-group range (age category 3) was only 31.7 percent, which was far below the expected frequency of 70 percent. Thus, there is a considerable gap between the rates of attainment of territorial decentration observed by Stoltman for the American sample and those discovered in this study for the Kenyan African children.

As a result of the Chi-squared tests to which the present research data were subjected, and as shown in Table 10, Chi-squared values of 503.94, 594.93 and 730.83 were respectively obtained for Age-Stage Fits A, B and C, with 5 degrees of freedom, and were all found to be significant

well beyond the 0.05 level, since the Chi-squared value required to attain significance at the 0.05 level, with 5 degrees of freedom, is only 11.07 (see Table VI.11). It can, therefore, be concluded that there is a significant difference between Piaget's (1928, 1951) Spatial Stages and the attainment of TDSs by the subjects studied in the present research. Thus, since there is no evidence to support the first hypothesis that '...the respective use of Age-Stage Fits A, B and C will reveal that there is no significant difference between Piaget's (1928, 1951) Spatial Stages and the stages and rates of the DTD in a sample of Kenyan African children', this hypothesis is rejected in its null form beyond the 0.05 level of statistical significance.

The discovered differences between the qualitative aspects (stages and rates) of the DTD amongst the Kenyan African children and the samples of Swiss and American children interviewed in earlier studies, all of whom were classified according to Piaget's theoretical spatial stages, are attributable to a number of factors. These factors are discussed below.

Firstly, as Jahoda (1964) and Stoltman (1971, 1976a) discovered, a large measure of the differences can be explained in terms of the differences in data collection methodology. It may be recalled that, due to the arguments advanced in Chapter II, the present investigator decided to adopt and use, mutatis mutandis, the same data collection methodology and measures that Stoltman developed and used. For this reason, the present investigation was viewed, partly, as a replication and extension of Stoltman's (1971) study in the USA. Thus, it seems reasonable to maintain that, due to the substantial methodological changes Stoltman made in the main data collection instrument, the TDT, the present research revealed the differences it did. The methodological changes Stoltman (1971, 1976a) made are as quoted below:

> Any consideration of instrument comparability necessitated recognising the nationalism component of Piaget's (1951) research. The influence of nationalism in the assignment of stages was not revealed by Piaget. It is possible that nationalism was reflected in Piaget's stages, rather than the concept of territorial relationships. Jahoda (1964) recognised the same possibility and concluded that Piaget had indeed weighed nationalism more importantly in assigning stages than the territorial relationships elicited using the circle placement task.

> ....to investigate the alterations in territorial stage assignment which resulted when only the Piagetian circle task was used, territorial stages were assigned using only TDT Sub-test criteria. The resultant differences between the theoretically expected and observed stages and ages frequencies for the three age fits (Table 2) were significant ($p < .001$). Therefore, the probability that Piaget had used the task requiring the placement of circles as the key determinant of stages was doubted. It was highly probable, as Jahoda (1964) speculated, that Piaget relied upon nationalism responses in assigning stages.
>
> A final difference in data collection was.....the attempt not to teach the child responses for items through wording and sequence of earlier items on the TDT. Whereas Piaget had primed the child.....by introducing political verbal titles early in the interview, the present (1971) method required the child to provide the initial verbal titles. The researcher tended to discount the current procedure as a serious handicap to overall performance, or in violation of Piaget's premise. Overall performance on the test was not contingent upon the recall of political titles by the child since such titles were introduced by the examiner in Sub-tests B, C and D, in keeping with Piaget (Stoltman, 1976b: 48-49).

The second contributory factor, which is also related to the first one, is the variation in the techniques used to analyse data. Again, as Stoltman (1971, 1976a) was able to observe from his investigation, 'an inappropriate cell frequency assignment of the expected hypothetical distribution, based on Piaget's reports, was a major consideration in searching for variance' (Table III.3). As the results in Table VI.10 revealed, a greater difference between the expected and observed distributions in the present study might have been caused by the recommended alterations which increased the hypothetical expected frequency in Piaget's expected cells of aggregation. It is possible that this increase in the theoretical expected frequency in turn resulted in the high Chi-squared values shown in Table VI.10. The present investigator shares Stoltman's (1976b: 49) explanatory view that 'the magnitude of the Chi-squared values obtained was indicative of differences in basic assumptions and not the result of differences in statistical procedures'. This is especially so when one recalls that Piaget neither subjected his data to rigorous statistical treatment nor did he control age and response sets in the determination of the TDSs. All these issues might have played a part in causing a certain amount of discrepancy

between Piaget's (1928, 1951) theory of spatial stages and the results obtained from the present sample of Kenyan African children, just as had been the case with Stoltman's American sample.

The third factor to which the occurrence of differences in the qualitative aspects of the DTD can be attributed is constituted by the differences in the characteristics of the samples and the sampling procedures used in the studies concerned. All these aspects were discussed in detail in Chapter II which outlined the statements of rationale of the present research and of the research hypotheses. The forthcoming analysis and discussion of the results obtained from testing each of the subsequent hypotheses, which were set up in relation to such descriptive variables as age, sex differences, grade, PEERE and SESP might help to throw more light on the relative influence of these variables in causing differences in the qualitative aspects of territorial decentration. At this stage, however, it is worth remembering that Piaget's (1928, 1951) Swiss sample was predominantly urban in character.

Lastly, the factor of cultural differences between Kenya and Switzerland can also be cited as one of those which contributed to the general lack of correspondence between the expected and observed frequency distributions in the present study. According to Jahoda (1963) and Stoltman (1971, 1976a), the findings from Scotland and the USA tended to refute, to some limited extent, the universality of Piaget's theory of spatial stages on account of the inherent cultural differences of the subjects studied. This should not be surprising since Piaget was found to have been inclined to apply his theory to all children although he had recognised the possibility that his limited selected sample of Genevan children was a special one. Stoltman (1976b: 50) observed that Switzerland has such overt cultural differences as multi-lingualism, canton dialects, and, sometimes, habits of dress associated with a specific territory. He argued that since the USA incorporates numerous political territories without the above-named overt cultural differences, the absence of these variables helped to explain the general lack of fit between Piaget's theory and the territorial stages as attained by the American sample.

Cultural differences are again evident as between Kenya and both Switzerland and the USA. Firstly, Kenya is a relatively young developing

country, having attained political Independence as recently as 1963, as was noted in Chapter IV. The implication of this for this research is the possibility that the spirit of nationalism generated amongst the citizens prior to Independence continues to persist. Secondly, and in relation to the first point, it is important to take into consideration the various measures being taken by the Kenya Government to foster national unity, as was discussed at length in Chapters II, III and IV. The probable result of most of these measures is an apparent increase in the amount of awareness of political territorial relationships, on the spatial aspects of which this investigation focussed particular attention. Finally, the fact that, in comparative terms, Kenya is generally less urbanised than either Switzerland or the USA may also help to account for the differences discovered in the qualitative aspects of the DTD amongst a sample of Kenyan African subjects and those of the Swiss and American children. Nevertheless, more substantial empirical research would be necessary to determine, more accurately, the extent to which some of the cultural factors posited above contribute to the occurrence of the differences in the qualitative aspects of the DTD which were discovered in this study.

VI.2.A.2 The Relationship between Age and the DTD in a Sample of Kenyan African Children

It was noted in Chapter III.2, pages 131-134, that several earlier investigators reported finding age to be a significant factor in explaining the differential rates in the DTD (for example, Piaget (1928, 1951), Stoltman (1971, 1976a) and Oliviera, 1976). A further need to examine the relative influence of this factor upon the DTD in the subjects studied in this research was expressed in that chapter.

Table VI.12, page 330, shows, amongst other results, the numbers and percentages of the attainment of TDSs.II and III by the subjects in the sample, as classified according to the three (3) age-group categories (see also Figures VI.1.A-C, VI.3.C.ii and VI.4, and Appendix VI.4). An examination of the results presented in Table VI.12 reveals a number of important patterns.

Firstly, the table clearly shows that, as was predicted, the rate of DTD increases with increasing age. Thus, while the greatest number

(96) or percentage (91.4, that is, 8.9 above the average percentage of 82.5) who attained TDS.III were in the oldest age-group category of 16 to 20 years (3), the smallest number (55) and percentage (67.9), that is, 14.6 below the cited average percentage) came from the youngest age-group category of 11 to 13 years. Secondly, the only subject who was classified in TDS.I was aged 11 years. Thirdly, again as was predicted, whereas the greatest number (26) and percentage (32.1, that is, 14.6 below the average percentage of 17.5) who attained TDS.II came from the 11 to 13 age-group category, the smallest number (9) and percentage (8.6) were in the 16 to 20 age-group category. Fourthly, the numbers and percentages for the intermediate age-group category of 14 to 15 years occupied an intermediate position on the scale of the DTD. Thus, while 71 subjects or 85.5 percent (that is, just 3.0 percent above the average of 82.5) in this category were classified in TDS.III, the figures for TDS.II were 12 subjects or 14.5 percent (that is, 3.0 percent below the average percentage of 17.5).

A computed Chi-squared value of 18.31, with 2 degrees of freedom and a probability of less than or equal to 0.0001 ($p \leq 0.0001$), was obtained (Table VI.12). Since Chi-squared values of only 5.99 and 9.21 would be necessary for the differences discovered to attain statistical significance respectively at the 0.05 and 0.01 levels, the obtained value of 18.31 was found to be highly significant at the 0.01 level and thus well beyond the 0.05 level. This Chi-squared test revealed the existence of statistically significant differences between subjects of different ages, with the older subjects in the sample completely outperforming their younger counterparts on the TDT. There is, therefore, no evidence to support the second hypothesis that 'there is no significant relationship between age and the DTD in the sample of Kenyan African children'. For this reason, this hypothesis is rejected in its null form beyond the 0.05 level of significance.

At this stage, it is worth noting that age was one of the independent variable factors chosen in the correlation and stepwise regression analyses which were performed by the computer on the numerical data of this research. It thus remains to be seen whether the results obtained from the above-named quantitative analyses, which will be discussed later in this chapter, will prove or disprove the validity of the finding

and conclusion reported above, both of which were based on the Chi-squared test analysis of the data. There are, however, a number of points which may be noted from a comparative examination of the Chi-squared test results of this research with respect to the relationship between the age of the subjects and their DTD.

Firstly, the present study's findings and the evidence for the existence of statistically significant differences reported so far are all in general conformity with those reported from several of the earlier related investigations. In this instance, it will be recalled that Piaget and his associates (1928, 1951) concluded that the child's ability to create a schema with the correct territorial relationships improves in sequence with increasing age, and Jahoda (1963), Stoltman (1971, 1976a) and Oliviera (1976) discovered that age significantly influenced the DTD amongst their respective samples of Scottish, American and Brazilian children.

The second point bears relevance to the problem of the "universality or cultural relativism of the developmental endpoint" which was discussed in relation to Piaget's (1972) revised position with respect to the attainment of the final global stage of formal operations (see Chapter I.5, pages 45-46). It was observed that the crux of Piaget's (1972: 6 and 10 revised argument was to the effect that while all individuals reach the stage of formal operations, if not between 11 and 15 years, at least between 15 and 20 years, they nevertheless reach this stage in different environments according to their individual aptitudes and professional specialisations. This view was reiterated by Dasen and Heron (1980: 49) in terms of Flavell's and Wohlwill's (1969) "competence/performance distinction model" to the effect that whereas all adults have the competence for formal operations, this competence may be reflected at the performance level only in some favourable circumstances. The need to investigate, in this research, the relevance of the phenomenon of the cultural relativism of the developmental endpoint and the associated arguments in relation to the DTD amongst Kenyan subjects was expressed in Chapters I.5, page 46, and III.1, pages 126-129. Against this background, the present study's findings that the greatest number of the territorially decentred Kenyan subjects were from the 16 to 20 age-group category and that all the 20-year-old

subjects attained TDS.III help to confirm the applicability of the phenomenon described above to the Kenyan context. Nevertheless, given that the subjects who participated in this research were aged 11 years and above, there seems to be a further need to investigate the DTD in a sample of younger Kenyan children. Such a study might help to generate more information about the general problem of the relationship between age and the DTD, especially at the ages lower than 11 years.

Thirdly, given the fact that in Kenya, the children's chronological ages are not always necessarily the same as their "school ages" due to a number of reasons which were discussed in Chapter IV.3.2.b.i, pages 204 - 206, and in view of the important differences discovered so far in the DTD amongst subjects who are not similarly-aged in this study, it would be worthwhile to find out whether or not these differences also occurred between the performance of the subjects in the different grades or years of schooling which were involved in this research.

VI.2.A.3 The Relationship between Sex Differences and the DTD

On the basis of their performance on the TDT, and to help determine the relative effects of sex differences in the DTD, all the subjects in the Kenyan sample were classified into the 3 TDSs according to their sex. Table VI.13, page 331, shows the distribution and percentages of this classification.

As can be noted from the table, firstly, only one (1) eleven-year-old female subject from Region 3 (Narok) attained TDS.I. This subject and TDS.I were excluded from the statistical analysis of the data. Thus, the total number of subjects used to calculate the percentages was 269. Secondly, the table clearly shows that while a greater number or percentage of girls (33 or 24.6%) than boys (14 or 10.4%) was classified in transitional TDS.II, more boys (121 or 89.6%) than girls (101 or 75.4%) attained TDS.III. Thirdly, given that the average percentage in attaining TDS.III, the formal operational level of TD, was 82.5, it is significant to note that while 7.1 percent of the most successful boys were above the stated average, an equal percentage of girls (7.1) was below that average. Overall, therefore, the boys were found to be more territorially decentred than the girls in the same Kenyan sample.

To determine the significance of the relationship between sex differences and the DTD, the TDT scores obtained from this research were subjected to the Chi-squared test. A computed Chi-squared value of 8.52 (with 1 degree of freedom and p = 0.004) was obtained (Table VI.B). Thus, since a Chi-squared value of only 6.64 would be required, the obtained value was found to be significant at the 0.01 level.

This analysis indicated the existence of statistically significant differences between the sexes with respect to the DTD. Given the foregoing, there is no evidence to support the third a priori hypothesis that 'there is no significant relationship between sex differences and the DTD in Kenyan African children'. In conclusion, therefore, this hypothesis is rejected in its null form at the 0.01 level of significance.

A number of points can be noted from the foregoing analysis with respect to the relative influence of the sex differences in the DTD. Firstly, as predicted in Chapter III.3, pages 134-137, the differences discovered were more in favour of the boys than the girls. This seems to confirm the view that the differences in the experiences of the environment and in the types of duties performed by Kenyan African boys and girls exert their influence in partly causing the sex differences discovered in the DTD in this study. The fact that the boys in the sample generally outperformed the girls emphasises the need for making more readily available to girls those experiences and facilities which might help to enhance the DTD in order to contribute to the rectification of the imbalances that were discovered from this investigation.

Secondly, it is significant to note that the present discovery of general sex differences in the subject's performance on the TDT is in line with the relevant findings reported by such earlier workers as Almy (1967b), Arap-Maritim (1979), Eshiwani (1980), Jahoda (1963a and b), Lord (1941), Mwaniki (1973), Otaala (1973), Renshaw (1979) and Witkin et al. (1978), as was discussed at length in Chapter III.3. On the other hand, it was observed that such other investigators as Jaspars et al. (1965), Oliviera (1976), Rivoire (1961) and Stoltman (1971, 1976a) did not find any significant differences as between the sexes in the performance of their subjects. Hence, the further need to study the relative influence of the factor of sex differences in subsequent studies of the

DTD, especially amongst subjects younger than those interviewed in the present research.

VI.2.A.4 The Relationship between Grade or Year of Schooling and the DTD

The justification for examining the relative influence of the grade or year of schooling of the Kenyan African children in the research sample in their DTD was provided in Chapter III.4, pages 138 to 139. Thus, the performance of the subjects on the TDT was viewed in terms of TDSs. and years of schooling. Table VI.14, page 332, presents the numbers and percentages of the attainment of TDSs. by the subjects according to grades or years of schooling.

The following points can be observed from the results presented in Table VI.14. Firstly, only one (1) subject from Standard VI (the sixth year of primary school) in Region 3 (Narok) attained TDS.I. This subject and TDS.I were not included in the subsequent statistical analysis, for which the overall total number of subjects used to calculate the percentages was 269. Secondly, performance on the TDT improved with increasing grade. Thus, while 67 subjects in Standard VI (75.3 percent) attained TDS.III and 74 or 82.2 percent in Form 1 (the first year of secondary school), the greatest number (81) and percentage (90.0) were found in Form 3 of secondary school. Thus, the greatest number of territorially decentred subjects were in the highest grade which participated in this research (Form 3). Thirdly, on the other hand, attainment of transitional TDS.II decreased, as predicted, with increasing year of schooling. Thus, while only 9 subjects (10 percent) were in Form 3 and 16 (17.8 percent) were in Form 2, the greatest number (22) and percentage (24.7) of subjects classified in this stage were from Standard VI.

As shown in Table VI.14, the data were analysed using the Chi-squared test to help determine the significance of the relationship between grades or years of schooling and the DTD. A Chi-squared value of 6.73, with 2 degrees of freedom, was obtained and found to be significant beyond the 0.05 level ($p = 0.035$). On the basis of this analysis, the fourth hypothesis that 'there is no significant relationship

between the grade or year of schooling and DTD in Kenyan African children' is rejected in its null form since statistically significant differences were discovered in the performance of the subjects.

Since none of the earlier related studies had examined the effects of grade or year of schooling in the DTD amongst the subjects concerned, as was noted in Chapter III.4, the finding from the present investigation, as outlined above, seems to have introduced a new dimension in further research on the DTD. The results obtained seem to confirm the predicted trend that the DTD improves as the grade or year of schooling increases. The conclusion which can be drawn from this observation, and whose implication will be discussed in the next chapter, is that formal educational instruction clearly influences the DTD. Furthermore, with specific reference to the Kenyan educational context, it is worth remembering that the child's year or grade of schooling is not as dependant upon the child's chronological age as is the case, for example, in England and Wales. This factor, therefore, seems to underline, to a certain degree, the importance of "school age" in the determination of the DTD. Hence, the importance of examining its relative effects in future research on the DTD.

VI.2.A.5 The Relationship between SESP and the DTD

The rationale for examining the relative influence of SESP of the participating subjects of the present research upon their DTD was presented in Chapter III.5, pages 139-143. However, since the numbers of subjects in the individual SESP categories shown in Table III.4, page 144, were too small for individual statistical processing, a decision was made to re-group them into two major categories, as outlined below. The first category (1) was designated as one of "Professionals" and was comprised of the original categories I to VI. The second category (2) was designated "Non-professionals" and was constituted by original categories V, VI and 0 (the "Don't Knows").

Table VI.15, page 333, shows the numbers and percentages of subjects who attained TDSs. II and III, as classified according to the two SESP categories of Professionals (1) and Non-professionals (2). A number of comments can be made about the data presented in this table.

Firstly, as noted above, only one 11-year-old female subject, who came from Region 3 (Narok) and attained TDS.I, belonged to SESP category 2 (VI). This subject and TDS.I were excluded from the statistical analyses, thereby leaving an overall total number of 269 subjects, which was the base figure used to calculate the percentages of TDS attainment.

Secondly, the results in the table clearly show that a greater number (32) and percentage (25.8) of professional workers' children attained TDS.II than did the non-professional workers' children, for whom the number and percentage were only 15 and 10.3, out of the row totals of 47 subjects and 17.5 percent, respectively. With regard to the attainment of TDS.III, it is important to note, finally, that the subjects from the non-professional parental background completely outperformed their counterparts in the professional parental categories. Even if one were to note that there were 145 subjects (53.9 percent) classified in SESP category 2, in comparison with the 124 subjects (46.1 percent) classified in SESP category 1, the fact remains that there was a very big difference in the attainment of TDS.III. This is so because whereas 130 subjects or 89.7 percent (that is, 7.2 percent above the average percentage of 82.5) in the non-professional workers' category (2) attained TDS.III, there were only 92 subjects or 74.2 percent (that is, 8.3 percent below the average percentage) classified in this formal operational stage of the DTD.

A Chi-squared test was applied to the data presented in Table VI.15 to determine whether the differences discovered between the performance on the TDT of the subjects in the two SESP categories were statistically significant. Chi-squared values of 3.84 and 6.63, with 1 degree of freedom, would respectively be necessary for the differences between variables to be found significant. Thus, since a Chi-squared value of 10.04 was obtained from the above-named analysis, with 1 degree of freedom, it can be observed that the differences discovered between the DTD amongst the two SESP categories of subjects were significant well beyond the 0.05 level. Therefore, the fifth hypothesis that 'there is no significant relationship between the SESP of Kenyan children in the sample and their DTD' is rejected in its null form well beyond the 0.05 level of significance.

The significant differences discovered in the attainment of the TDSs., as discussed above, can possibly be explained in terms of the regional distribution of the subjects according to SESP categories. As noted from Tables III.4 and VI.15, the majority of subjects from the non-professional parental background were predominantly found in the remote rural and, to some limited extent, in the semi-rural areas. As will be discussed later, there was a general tendency for subjects from the remote rural environment of Region 3 (Narok) to outperform their counterparts in the semi-rural and the urban regions on the TDT. On account of this observation, it is possible to conclude that such opportunities for operating in the open physical environment as are available to the children of lower SES parental background and, to a certain degree, the traditional life-styles which are still prevalent in the rural areas of Kenya, all help to enhance the development of a greater degree of TD amongst subjects from the non-professional SESP category than their counterparts in the professional SESP category.

It may be recalled that Jahoda (1963a) and Stoltman (1971, 1976a) reported finding significant differences in the performance of subjects from upper and lower SES parental backgrounds (see Chapter III.5, pages 139 to 143) just as the present investigator discovered. However, there is some difference between the findings reported in those earlier studies and the present one. For example, whereas Jahoda (1963a) discovered that the Scottish children from the middle class parental and school backgrounds significantly out-achieved those drawn from schools in the 'dilapidated working class districts of Glasgow' and while Stoltman (1971, 1976a) found that the black children, who predominantly came from the lower socio-economic parental background, were outperformed by the white subjects, who had a better socio-economic parental background, the reverse has been discovered in this research. As reported and discussed above, Kenyan African children from the lower non-professional SESP category were discovered to be more territorially decentred than those in the sample who came from the higher professional SES parental background. Finally, it is also important to note that this study's reported finding is in sharp contrast to the prediction that 'should a significant relationship be discovered between SESP and DTD, the subjects from the higher professional (non-manual) categories I to IV (1) will tend to perform better than those in the lower non-professional

(semi-skilled and unskilled) SESP categories V, VI and 0 (2)' (see Chapter III.5, page 142).

VI.2.A.6 The Relationship between the PEERE and the DTD in a Sample of Kenyan African Children

As was discussed at length in Chapter III.6, pages 143 to 151, one of the crucial aspects upon which attention is being focussed in this research was the investigation of the relative influence of the PEERE of the Kenyan African children in the sample upon their DTD. It may also be recalled that an equal number (90) of subjects was selected from each of the three regions which participated in this study (see Table IV.4, page 235). This was done to facilitate the testing of the a priori hypothesis that 'there is no significant difference in the DTD between Kenyan African children drawn from the remote rural, open grassland and least-carpentred environment of Region 3 (Narok); the peri-urban high plateau, sub-humid, forested and more "closed" landscape of Region 2 (Kiambu); and the built-up metropolitan urban and most carpentred-world environment of Region 1 (Nairobi)' which was set up at the end of Section 6 of Chapter III, page 151.

Table VI.16.A, page 334, shows the numbers and percentages of subjects in the sample who attained TDS.III by regions (see also Figure VI.1.A-C, page 320, and Appendix VI.1, page 486). The results in this table show that, firstly, with the exception of the one subject who was classified in TDS.I and came from Region 3, 222 subjects, or 82.5 of the total research sample of 269, attained TDS.III. Secondly, the greatest number (83) and percentage (93.3) of subjects attaining this stage were to be found in the remote rural and open grassland or "vistaed" region of Narok (3) for which the rate of successful attainment was 6.8 above the average percentage of 82.5. On the other hand, and thirdly, as had been predicted in Chapter III.6, pages 150 to 151, the smallest number (61) and percentage (67.8) of subjects who attained TDS.III were from the relatively "closed and carpentred-world" environment of the urban region of Nairobi (1), whose overall attainment rate was 14.7 below the average percentage cited above. Fourthly, as was predicted, with a total number (78) and percentage (86.7) of subjects attaining TDS.III, the transitional region of Kiambu (2) occupied an intermediate position, its rate of attainment being only 4.2 above the overall average

percentage of 82.5. In the fifth and final instance, while there is a large gap between performance of the subjects from Regions 2 and 1, the difference being 18.9 percent, and whereas the gap between the subjects' performance in Kiambu and Narok is only 9.6 percent, a much greater difference of 25.5 percent is found between that of the subjects drawn from Nairobi and Narok.

A Chi-squared test applied to the numbers of subjects who attained TDS. III in the three regions gave a Chi-squared value of 3.60, whereas, with 2 degrees of freedom, a Chi-squared value of 5.99 would be required for the differences discovered between the variables to attain significance at the 0.05 level.

Further Chi-squared tests were, however, performed on the data in Table VI.16.A to determine whether the actual "extreme" differences discovered between the attainment of TDS.III amongst the subjects in Regions 1 and 2, on the one hand, and Regions 1 and 3, on the other, are statistically significant, as the results below show.

Firstly, although the differences between the subjects' attainment of TDS.III in the Nairobi and Kiambu regions appear to be great, the results of the Chi-squared test applied to the data suggest that these differences are not necessarily significant. This is so because a Chi-squared value of only 2.50 was obtained, whereas, with 1 degree of freedom, a Chi-squared value of at least 3.84 would be necessary for the differences to attain significance at the 0.05 level. Secondly, however, the Chi-squared value (3.38) obtained by comparing the numbers attaining TDS. III in Nairobi and Narok approaches much more closely to significance at the 0.05 level whereby, with 1 degree of freedom, a Chi-squared value of at least 3.84 would be required to attain significance.

On the basis of the foregoing observations, therefore, it seems reasonable to conclude that though there may well be a relationship between the PEERE of the subjects in the present research and their attainment of TD, the Chi-squared test results obtained fell short of statistical significance at the 0.05 level. However, it would be interesting to find out whether the same observations and conclusion are true of the subjects' relative attainment of transition TDS.II, as shown below.

The numbers and percentages of the subjects in the research sample who attained transitional TDS.II according to their regions of residence are provided in Table VI.16.B, page 334. The results in the table clearly show that, as predicted, the numbers and percentages of subjects attaining this transitional TDS increases as one moves nearer and into the urban environment of Nairobi from Region 3. Thus, whereas the remote rural region of Narok (3) had only 3 or 6.7 percent (that is, 10.8 below the average attainment percentage of 17.5) of the subjects classified in this stage, and Kiambu (2) had 12 subjects or 13.3 percent, the greatest number (29) and percentage (32.2, that is, 14.7 above the average percentage cited above) of subjects in TDS.II were from the "closed and carpentred-world" of the Nairobi urban environment. On the whole, therefore, subjects in the urban region were less territorially decentred than their counterparts in the semi-rural and remote rural environments.

A Chi-squared test applied to the numbers of subjects classified in TDS.II in the three regions gave a Chi-squared value of 18.17 which is significant beyond the 0.05 level, whereas, with 2 degrees of freedom, Chi-squared values of 5.99 and 9.21 would be necessary to attain significance respectively at the 0.05 and 0.01 levels. The Chi-squared value of 18.17 therefore indicates a very high degree of significance in the different results obtained from the subjects' performance in the three regions. This observation was further confirmed by the Chi-squared value of 17.31 which was obtained from comparing the results of Nairobi and Narok and was also found to be significant well beyond the 0.05 level, with 1 degree of freedom for which a Chi-squared value of only 3.84 would be necessary to attain significance.

To conclude this discussion of the relative influence of the PEERE of the subjects in this research sample upon their DTD, it is necessary to note that though a relationship may well exist between the above-named variables, the Chi-squared test results obtained fell somewhat short of statistical significance at the 0.05 level. Nevertheless, the differences within the attainment of transitional TDS.II were found to be statistically significant well beyond the 0.05 level. In general terms, then, since the greatest numbers and percentages of subjects who attained TDS.III were found in Region 3 (Narok), followed by Kiambu (2), with Nairobi producing the smallest numbers and percentages, the

weight of evidence appears to favour the rejection of the sixth hypothesis in its null form, though the evidence is not statistically conclusive. The differences discovered were, as predicted, in favour of the subjects drawn from the remote rural, and, to some limited extent, semi-rural environments of Kenya. This finding is in conformity with the general trends suggested in either the "ecological-cultural functionalistic model" set up by Berry (1966b, 1971, 1976), and/or the "closed, carpentred-world versus open-vistaed and less carpentred-world" hypothesis put forward by Segall et al. (1966). With particular reference to research on the DTD, it is worth remembering that such earlier investigators as Marsh (1966) found that the rural subjects in her Scottish sample were significantly more advanced than the urban children in developing the concept of Great Britain. However, Stoltman (1971, 1976a) did not find any significant difference between the performance of the urban and rural children in his American sample. These cross-cultural differences may be explained, partly, in terms of the extent to which the country in which the research was undertaken is urbanised. The urban environment of Nairobi City/Province is clearly distinct from the rest of Kenya, which is a predominantly rural country. Thus, since the majority of the territorially decentred subjects were from the remote rural and less urbanised environment of Narok District (Region 3), it may be concluded, just as Marsh (1966) did, that the (open) rural environment generally plays a more important role than the urban environment in enhancing the DTD and the related spatial relationships. Finally, this conclusion seems to tie in well with the finding reported above in Section VI.5, page 297, with reference to the relative influence of the SESP of the subjects upon their DTD.

VI.2.B Pearson's Correlation and Stepwise Regression Analysis of the Research Data

One of the statistical indicators of the strength and direction (that is, the positiveness or negativeness) of the mutual relationship between any given two research variables is the "correlation coefficient" (see, for example, Theakstone and Harrison (1970: 86-87) and Snedecor and Cochran, 1967: 172). Table VI.17, page 335, therefore, presents the Pearson's coefficients of correlation which were computed between

those variables of the present research whose data were in numerical form, including the dependent variable TDTT and its component elements (TDTB and TDTE). As shown in the correlation matrix (Table VI.17), the variables involved were the subjects' age and scores on the present study's criterion measures, namely, the SCDT, PRFT, CIT and TDT.

As Snedecor and Cochran (1967: 174) indicate, the correlation coefficient (r) always lies between -1 and +1. Thus, while the positive value of r indicates a tendency of, for example, variables A_1 and A_2 to increase together, the negative values of r tend to indicate that large values of A_1 are associated with the small values of A_2. In view of the foregoing, a number of important points can be observed from Table VI.17, as descriptively outlined below.

Firstly, a moderate positive correlation ($r = 0.362^3$, $p \leq 0.05$) was found between age and TDTT. Secondly, while the positive correlations between SCDTT and TDTT ($r = 0.160$), SCDT 2 and TDTT ($r = 0.146$), and CD and TDTT ($r = 0.127$) are low, they are nevertheless significant at the 0.05 level. Thirdly, the very slight negative correlation observed between PRFTR and TDTT ($r = -0.063$) was not found to be significant at the 0.05 level. Fourthly, TDTB and TDTE correlated very highly with TDTT, with the respective correlation coefficients of 0.979 and 0.963 being significant at the 0.01 level. The existence of the high correlations mentioned immediately above is, as would be expected, due to the fact that TDTB and TDTE are in fact component test elements of the present study's main criterion instrument, the TDT. Thus, the TDTT score is comprised of the scores obtained from TDTB and TDTE. Hence, the high correlations found between the three measures. The same point can help to explain the occurrence of noticeable correlations (which are significant at either the 0.05 or the 0.01 levels) between the main criterion measures and their various component test elements. Such correlations were found between, for example, SCDT1 and SCDTT ($r = 0.749$), SCDT2 and SCDTT ($r = 0.889$); PRFTR and PRFTT ($r = 0.868$), PRFTL and PRFTT ($r = 0.893$); and between PRFTR and PRFTL ($r = 0.570$). Finally, it is noteworthy that of all the variables in the matrix, PRFTT correlated least with TDTT ($r = -0.015$), and was followed by CIT ($r = -0.042$). Neither of these correlations was statistically significant.

Despite the attempt made above to describe the correlations found between some of the present research variables, it is important to note that the major limitation of this technique of data analysis is that the correlation coefficient (r) does not, however, help to show how two variables are related to a third one (see, for example, Theakstone and Harrison, 1970: 87). Thus, in order to determine the combined effects of one or more of the variables shown in Table VI.17, page 335, on the TDTT, the present research data were further analysed through the process of stepwise regression, with the results described below.

The stepwise regression[4] procedures indicated that age was the most important variable in explaining variation in the subjects' performance as operationally revealed by their total scores on the TDT (that is, TDTT). For the variable's contribution to the explanation of the variation in the dependent variable to be significant at the probability level of less than or equal to 0.05 ($p \leq 0.05$), an F value greater than or equal to 3.84 ($F \geq 3.84$) is necessary, with the degrees of freedom being 1 and infinity (∞). An F value of 40.35, obtained from the regression of age with TDTT, with 1 and 268 degrees of freedom, is not only greater than that of 3.84 but it is also significant beyond the 0.05 level (refer to Table VI.18, page 336). This result helps to confirm the earlier finding from the Chi-squared test which was reported and discussed in Section VI.A.2, pages 290-292, to the effect that age is a significant factor in accounting for the variation in the TDTT scores. Again, given the further statistical evidence described above, the second hypothesis of 'no significant relationship between age and the DTD in the sample of Kenyan African children' is rejected in its null form at the 0.05 level of significance. Hence, the conclusion that age was a significant factor in influencing the DTD amongst the subjects studied in this research.

The second variable chosen in the stepwise regression equation was SCDTT. Thus, Table VI.19, page 336, shows the results of regressing age and SCDTT with TDTT. The obtained F value of 4.19 was found to be significant at the 0.05 level, with 1 and 267 degrees of freedom.

The rationale for investigating the relative influence of the levels of the development of space concept or the effectiveness of spatial judgment of the subjects of this research upon their DTD was outlined in Chapter III.7, pages 151-153. It was noted, inter alia, that the child

is said to be able to decentre territorially from one point of view (egocentrism), to differentiate between his own and other points of view (perspectivism), to increase his understanding of reality in the environment around him and to integrate this co-ordination or equilibration of perspectives, all of which are clearly essential to the child's DTD (see, for example: Piaget and Inhelder (1956), Satterly (1964, 1977), Laurendeau and Pinard (1970), Garner and Plant (1972), Hart and Moore (1973) and Omari: 1976, 1977). It was thus predicted that a significant positive relationship would be found between the levels of space concept development or the effectiveness of spatial judgment and the DTD amongst the sample of Kenyan subjects.

On the basis of the results of the stepwise regression reported above, therefore, the seventh hypothesis that 'there is no significant relationship between the levels of the development of space concept or the effectiveness of spatial judgment, as measured in operational terms by the Three Mountains Co-ordination of Perspectives Task (SCDT), and the DTD in a sample of Kenyan African children' is rejected in its null form at the 0.05 level of significance. The waning of spatial egocentricity through the development of space concept is clearly crucial to an individual's increasing comprehension and differentiation of territorial or spatial reality in a tri-dimensional schema, as was discussed at length in Chapter III.7. The general performance of the subjects in the Kenyan sample on the SCDT and TDT has helped to confirm the view that the DTD is significantly influenced by the levels of the development of space concept.

During the subsequent stages of the stepwise regression procedure, the rest of the following variables: SCDT1, SCDT2, PRFTR, PRFTL, PRFTT, CD and CIT were entered into the regression equation together with age and SCDTT and were all jointly regressed with TDTT. The purpose of this process was to determine whether or not these other factors make a statistically noticeable contribution to the variation in the subjects' performance on the TDTT. The computed F values were found not to be significant at the 0.05 level, as the multiple determination coefficients (R) in Appendix VI.5.A-C, page 490, also help to show. Nevertheless, a further attempt was made to determine the proportion of variation in TDTB, TDTE and TDTT accounted for by age and age plus all other variables in the regression equation. Table VI.20, page 337,

presents the results obtained from that regression. To ensure an understanding of the statistical results in this table, it is essential to make concurrent reference to the computed statistical data in Appendix VI.5.A-C, page 490.

A careful study of the data in Table VI.20 reveals a number of important points. Firstly, it can be clearly seen that while age explained 14 percent of the variation in the subjects' scores on TDTB, the remainder of the variables entered in the regression, excluding age, accounted for only 3 percent; the joint contribution from the variables was 17 percent (refer also to Appendix VI.5.A, page 490). Secondly, for TDTE, whereas age on its own explained 11 percent of the variation, all the remaining factors collectively accounted for only 3 percent (that is, the joint contribution from all the variables, including age, was 14 percent) (see Appendix VI.5.B, page 490). Thirdly, with respect to TDTT, and as shown in Appendix VI.5.C, page 490 , while age on its own contributed 13 percent to the variation in the subjects' overall performance on the TDT, the rest of the variables in the regression equation accounted for merely 4 percent, the joint contribution from all the variables, including that of age, being 17 percent.

Given the foregoing results of the stepwise regression analyses, it seems reasonable to draw the conclusions stated below. Firstly, with the exception of age and SCDTT, as was discovered above, the remainder of the variables entered in the regression equation (namely, the SCDT1, SCDT2, PRFTR, PRFTL, PRFTT, CD and CIT) do not significantly contribute to the explanation of the variation in the subjects' performance on the TDT. This was so because of the relatively very low values of percentages of "R^2 change" shown in Table VI.20 and Appendix VI.5.A-C. Secondly, the same variables were not found to be influential in the DTD amongst the sample of Kenyan African children.

The need to investigate the relevance of Witkin's field-dependent and field-independent (FD-FI) cognitive styles of psychological differentiation to the DTD amongst the sample of Kenyan African children was stated and justified at length in Chapter III.8, pages 153-156. The PRFT was selected and used in this study, mutatis mutandis, to operationalise the subjects' FD-FI cognitive styles of psychological differentiation.

One of the most important predictions made was to the effect that, a significant relationship would be found between the subjects' performance on the PRFT and TDT. However, as a result of the stepwise regression analyses to which the research data were subjected, no statistically significant evidence emerged upon which the eighth hypothesis that 'there is no significant relationship between the FD-FI cognitive style dimension of psychological differentiation, as determined according to their performance on the PRFT, and the DTD, as determined according to their performance on the TDT' could be rejected. In conclusion, therefore, and contrary to what had been predicted in Chapter III.8, this a priori hypothesis is accepted in its null form. No statistically significant relationship was found between the subjects' performance on the PRFT and TDT. Thus, the factor of Witkin's FD-FI cognitive styles of psychological differentiation does not seem to be influential in the DTD amongst the sample of Kenyan African subjects studied in the present research.

Finally, the rationale for examining the relationship between the sample of Kenyan African children's operational logical class inclusion ability, as determined according to their performance in the CIT, using animals, and their DTD was outlined in Chapter III.9, pages 156-157. It was predicted that a significant relationship would be found between the two variables named above. Nevertheless, as described above, the simple correlation and stepwise regression analyses of the relevant research data did not generate statistically significant evidence which could form the basis for rejecting the ninth hypothesis that 'there is no significant relationship between the operational logical class inclusion ability of the Kenyan African children studied in the present research and their DTD'.

Against this background, therefore, and contrary to what had been predicted, Hypothesis 9 is accepted in its null form. The statistical tests performed on the research data revealed no evidence to support the contention that the operational logical class inclusion ability of the Kenyan African children studied in this research, as determined by their performance on the CIT (using animals), is significantly related to their DTD. Nevertheless, it remains to be determined whether a similar conclusion would be reached if a sample of subjects younger than those who participated in this investigation were to be studied. This last statement is indeed applicable to the rest of the variable

factors which were investigated in relation to the development of the concept of territorial decentration.

VI.3 Summary

This sixth chapter dealt with the presentation, analysis, interpretation and discussion of the experimental results in relation to the present research hypotheses. To facilitate understanding of the results, additional tabulated information about certain distributional aspects of the research sample was provided in Section VI.1.1. The descriptive statistics of the variables investigated in the study were presented in Section VI.1.2. Sections VI.2.A.1-6 dealt with the testing of the research hypotheses 1 to 6, which were based on data in categorical form, using the Chi-squared test. Section VI.2.B was concerned with the simple (Pearson's) correlation and stepwise regression analyses of the research data which were in numerical form and, therefore, with the testing of hypotheses 7, 8 and 9. The major results and conclusions are as summarised below.

VI.3.1 In terms of the subjects' general performance on the TDT and their attainment of the various TDSs., it was discovered that while out of a total research sample of 270, 222 (82.22 percent) subjects successfully attained TDS.III, which is the final formal operational level of TD, and 47 (17.41 percent) were classified in transitional TDS.II, only one (0.37 percent) eleven-year-old female subject attained TDS.I.

3.2 As predicted in Chapter III.1, the qualitative aspects of the DTD, especially the sequence of stages, were found to be generally identical in the Kenyan sample of 11 to 20-year-old subjects and the much younger samples (6 to 11 or 6 to 12 or 6 to 14 years) studied in earlier related investigations. Nevertheless, the rates of the DTD were found to be different. Given that the Chi-squared values of 503.94, 594.93 and 730.83, which were respectively obtained for Age-Stage Fits A, B and C, with 5 degrees of freedom, were found significant well beyond the 0.05 level, it was concluded that a significant difference exists between Piaget's (1928, 1951) Spatial Stages and the rates of the attainment of TDSs. by the Kenyan subjects. Thus, the first <u>a priori</u> hypothesis

that '....the respective use of Age-Stage Fits A, B and C will reveal that there is no significant difference between Piaget's Spatial Stages and the stages and rates of the DTD in a sample of Kenyan African children' was rejected in its null form beyond the 0.05 level of statistical significance.

It was found that while the Kenyan subjects tended to attain the various TDSs. at substantially greater chronological ages than the Swiss, American and Brazilian children studied earlier, the Kenyan children were generally entering the TDSs. at ages earlier than those predicted in Stoltman's (1971, 1976a) hypothetical model. This observation seemed to call into question the validity of the timing in Stoltman's model when applied to such an African sample as the present Kenyan one. It was further discovered that the Kenyan children, who were aged between 11.0 and 12.11 years, attained TDS.III earlier than the approximately similarly-aged American children studied by Stoltman but not so soon as the Swiss subjects interviewed by Piaget (1928, 1951).

3.3 The general results further showed that the rate of DTD increased proportionately with increasing age of the subjects studied and vice versa. Thus, while the greatest number (96) or percentage (91.4) of subjects who attained TDS.III were in the oldest age-group category of 16 to 20 years, the smallest number (55) and percentage (67.9) were from the youngest age-group category of 11 to 13 years. The Chi-squared tests, correlation and stepwise regression analyses of the research data generated substantially significant statistical evidence ($p \leq 0.05$) which led to the general rejection, of the second null hypothesis that '.... there is no significant relationship between age and the DTD in the sample of Kenyan African children'.

3.4 The third hypothesis that ....there is no significant relationship between sex differences and the DTD in Kenyan African children' was rejected in its null form since the computed Chi-squared value of 8.52 (with 1 degree of freedom) was found to be significant beyond the 0.05 level. The boys in the sample outperformed the girls. Thus, while a greater number or percentage of girls (33 or 24.6%) than boys (14 or 10.4%) was classified in transitional TDS.II, more boys (121 or 89.6%) than girls (101 or 75.4%) attained TDS.III. It was therefore concluded that Kenyan boys are on the whole more territorially decentred than the girls.

3.5 Performance on the TDT was found to be improving systematically with increasing grade or year of formal schooling. Thus, while only 67 subjects in Standard VI (the sixth year of primary school) or 75.3 percent attained TDS.III and 74 or 82.2 percent were in Secondary Form 1, the greatest number (81) and percentage (90.0) of the territorially decentred subjects came from Secondary Form 3. The Chi-squared value of 6.73, which was obtained and found to be significant beyond the 0.05 level, with 2 degrees of freedom, led to the rejection of the fourth null hypothesis that '... there is no significant relationship between the grade or year of formal schooling and the DTD in a sample of Kenyan African children'. It was thus concluded that formal educational instruction in the various school grades or years of schooling so influences the learners' DTD that those in the higher grades tend to be more territorially decentred than their colleagues in the lower school grades.

3.6 Contrary to what had been predicted, subjects from the lower SESP categories or the non-professional parental background out-achieved their counterparts in the higher professional parental categories on the TDT. Thus, while 130 subjects or 89.7 percent in the non-professional workers' category (2) attained TDS.III, there were only 92 subjects, or 74.2 percent, classified in this formal operational stage of the DTD. These differences were confirmed by the Chi-squared value of 10.04 which was obtained, with 1 degree of freedom, and was found to be significant beyond the 0.05 level. As a result, the fifth a priori hypothesis that '... there is no significant relationship between the SESP of Kenyan African children in the sample and their DTD' was rejected in its null form at the 0.05 level of statistical significance.

3.7 While the greatest number and percentage of territorially decentred subjects in the sample (83 or 93.3%) were from the remote rural and open grassland or "vistaed" environment of Region 3 (Narok), the smallest number (61) and percentage (67.8) of the most successful performers on the TDT were from the relatively "closed and carpentred-world" environment of the urban region of Nairobi (1). With a total number of (78) and percentage (86.7) of the most successful performers on the TDT, the semi-rural and relatively "closed" mountainous and forested environment of Kiambu (Region 2) occupied the intermediate position on the TDS.III attainment scale.

Though the general results showed that a relationship might well exist between the PEERE of the subjects and their attainment of TDS.III, the Chi-squared test results obtained fell short of statistical significance at the 0.05 level. However a higher Chi-squared value of 18.17 was obtained and found to be significant beyond the 0.05 level, with 2 degrees of freedom, when the test was applied to the numbers of subjects classified in TDS.II. This indicated a very high degree of significance in the different results obtained from the subjects' attainment of this stage within the three regions.

On account of the general regional differences discovered in the attainment of TDS.III and due to the statistically significant differences observed in the attainment of TDS.II, it was felt that the weight of evidence favoured the rejection of the sixth null hypothesis that '...there is no significant difference in the DTD between Kenyan African children drawn from the remote rural, open grassland and least-carpentred environment of Region 3 (Narok); the peri-urban, high plateau, sub-humid, forested and more "closed" landscape of Region 2 (Kiambu); and the built-up metropolitan urban and most carpentred-world environment of Region 1 (Nairobi'. The evidence was not, however, statistically conclusive. As predicted, subjects resident in the remote rural environment outperformed their counterparts in the semi-rural and urban regions of Kenya. It may, therefore, be argued that the factor of the PEERE of the subjects plays an important part in their DTD and that, furthermore, just as Marsh (1966) discovered, the rural environment plays a more significant role in enhancing the DTD than does the urban environment.

3.8 The computed F value of 4.19, obtained from the stepwise regression of age and SCDTT with TDTT, with 1 and 267 degrees of freedom, was found to be significant at the 0.05 level. Thus, the seventh null hypothesis that '.....there is no significant relationship between the levels of the development of space concept or the effectiveness of spatial judgment, as measured in operational terms by the Three Mountains Co-ordination of Perspectives Task (SCDT), and the DTD in a sample of Kenyan African children' was rejected at the 0.05 level of statistical significance. The waning of spatial egocentricity through the development of space concept was found to be crucial to an individual's increasing comprehension and differentiation of territorial or spatial reality in a tri-dimensional schema. The Kenyan subjects' performance on the SCDT and TDT helped to confirm the belief that the DTD is greatly

influenced, inter alia, by the levels of the development of space concept.

3.9 Despite further stepwise regression analyses of the research data, no statistically significant evidence emerged to form the bases upon which the remaining two a priori hypotheses could be rejected. Contrary to what had been predicted, no significant relationships were found to exist between, on the one hand, the FD-FI cognitive style dimension of psychological differentiation and the operational logical class inclusion ability, and the DTD on the other. Thus, the hypotheses restated below were accepted in their null form:

Hypothesis 8:

> '...that there is no significant relationship between the FD-FI cognitive style dimension of psychological differentiation, as determined according to their performance on the PRFT, and the DTD, as determined according to their performance on the TDT'.

Hypothesis 9:

> '...that there is no significant relationship between the operational logical class inclusion ability of the Kenyan African children studied in the present research and their DTD'.

The results and conclusions described and discussed in this chapter have formed the basis upon which the implications of the present research with special reference to geographical education in Kenya will be discussed in the next chapter, and in which suggestions for further related research will also be outlined.

VI.4 Notes and References

4.1 According to Siegel (1956: 43), the Chi-squared (χ^2) test technique is of the goodness-of-fit type in that it may be used to test whether a significant difference exists between an observed number of objects or responses falling in each category and an expected number based on the null hypothesis. It thus helps to test whether the observed frequencies are sufficiently close to the expected ones to be likely to have occurred under the null hypothesis (H_o).

2. For details about the SPSS Programme, reference can be made to Hull et al. (1979), Klecka et al. (1975), Nie et al. (1975), Nie and Hull, (March, 1977) and Norusis (1978).

3. The critical levels of correlation coefficients, as calculated for a sample of 270 subjects, for the probability significance less than or equal to 0.05 and 0.01 were, respectively, ± 0.120 and ± 0.157 (see Table VI.17, page 335). The procedure described below was used to obtain the critical levels named above: According to Lindley's and Miller's (1971: 6) "Table of the Transformation of the Correlation Coefficients" (Table 4), the variance of the correlation coefficient, when n is large is approximately:

$$\frac{1}{n - 3}$$

Thus, for the present study, with n = 270:

$$\text{Variance} = \frac{1}{270 - 3} = 0.03745$$

The standard deviation (S.D.) for the estimated correlation coefficient (r_n) is $\sqrt{0.003745} = 0.0612$.
Asymptotically, r_{270} is normally distributed with zero mean (under the assumption that the true correlation coefficient is equal to zero ($\sigma_{xy} = o$)), and the standard deviation is 0.0612.
For N(0,1), a two-sided 95 per cent confidence limit is the interval: -1.96 to 1.96(± 1.96) (see Table 1: "The Normal Distribution Function" in Lindley and Miller, 1971: 4). For N(0,1),

a two-sided 99 percent confidence limit is the interval: -2.575 to 2.575 (or ± 2.575) (see Table 1 in Lindley and Miller, 1971: 4).

For the present study's normal distribution, with S.D. = 0.0612, the first interval or critical level becomes:

-1.96 x 0.0612 to 1.96 x 0.0612 (or ± 1.96 x 0.0612)

= -0.120 to 0.120 (or ± 0.120); and the second interval or critical level becomes:

-2.575 x 0.0612 to 2.575 x 0.0612 (or ± 2.575 x 0.0612)

= -0.157 to 0.157 (or ± 0.157).

4. "Regression" is a statistical procedure for measuring the effect of one or more independent variable(s) on a dependent variable. "Stepwise regression" is a step by step regression procedure which takes the most explanatory variable, then the next one, and so on, until enough variables are included in the regression model to explain adequately the relationships involved. This adequacy is determined by a high value for R^2, which is a measure of how well the model explains the data (see, for example, Snedecor and Cochran (1967: 135-171 and 381-418).

TABLE VI.1

DISTRIBUTION OF ALL SUBJECTS BY SEX, AGE AND REGION

(N = 270)

Region or Sample	Age Group / Sex	11 M	11 F	12 M	12 F	13 M	13 F	14 M	14 F	15 M	15 F	16 M	16 F	17 M	17 F	18 M	18 F	19 M	19 F	20 M	20 F	TOTAL M	TOTAL F	OVERALL TOTALS
1 Nairobi N = 90		11	7	4	12	3	10	12	1	5	2	10	13	0	0	0	0	0	0	0	0	45	45	90
2 Kiambu N = 90		1	0	3	6	5	7	12	10	5	8	5	6	9	4	4	4	0	0	1	0	45	45	90
3 Narok N = 90		0	1	0	4	3	5	13	4	1	10	11	7	8	12	4	1	3	0	2	1	45	45	90
OVERALL COLUMN TOTALS		12	8	7	22	11	22	37	15	11	20	26	26	17	16	8	5	3	0	3	1	135	135	270

TABLE VI.2

NUMBERS AND PERCENTAGES OF ALL SUBJECTS BY AGE AND REGION

(N = 270)

Age Group	11		12		13		14		15		16		17		18		19		20		ROW TOTALS	
Region or Sample	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1 Nairobi N = 90	18	90	16	55.2	13	39.4	13	25	7	22.6	23	44.2	0	0	0	0	0	0	0	0	90	33.33
2 Kiambu N = 90	1	10	3	10.3	12	36.4	22	42.3	13	41.9	11	21.2	13	39.4	8	61.5	0	0	1	25	90	33.33
3 Narok N = 90	1	10	4	13.8	8	24.2	17	32.7	11	35.5	18	34.6	20	60.6	5	38.5	3	100	3	75	90	33.33
OVERALL COLUMN TOTALS	20	7.41	29	10.74	33	12.20	52	19.20	31	11.50	52	19.20	33	12.20	13	4.81	3	1.11	4	1.48	270	100

TABLE VI.3

DISTRIBUTION OF ALL SUBJECTS BY AGE-GROUPS, SEX AND REGION

(N = 270)

Region/Sample	Age-Groups	11 - 13			14 - 15			16 - 20			Nett Total (n)		Overall Total
	Sex	M	F	n	M	F	n	M	F	n	M	F	N
1. Nairobi N = 90		18	29	47	17	3	20	10	13	23	45	45	90
2. Kiambu N = 90		9	18	22	17	18	35	19	14	33	45	45	90
3. Narok N = 90		3	10	13	14	14	28	28	21	49	45	45	90
COLUMN TOTALS		30	52	82	48	35	83	57	48	105	135	135	270

TABLE VI.4

A SUMMARY OF THE DESCRIPTIVE STATISTICS COMPUTED FOR THE VARIABLES STUDIED IN THE RESEARCH

(N = 270)

Research Measures	Min.Score/ Age Observed	Max. Score/ Age Observed	Range	Mean	Mode	Median	St. Devn.	Skewness	St. Error of the Mean
1. AGE	11	20	9	14.64	14.00	14.53	2.09	0.10	0.13
2.a.TDT(Beh.)	21	38	17	35.84	37	36.42	2.39	-2.96	0.15
b.TDT(Expl)	10	22	12	20.12	20, 21	20.45	1.82	-2.19	0.11
c.TDT Total	34	60	26	55.96	58	56.46	4.09	-2.40	0.25
3.a.SCDT.1	0	3	3	1.85	2	1.93	0.94	-0.37	0.06
b.SCDT.2	0	5	5	3.64	5	3.90	1.36	-0.77	0.08
c.SCDT Total	0	8	8	5.49	8	5.60	1.91	-0.38	0.12
4.a.PRFTR	0	110	110	22.20	0	16.25	21.15	1.44	1.29
b.PRFTL	0	122	122	27.86	0	21.85	24.36	1.13	1.48
c.PRFT Total	0.5	220	219.5	50.41	17	39.75	40.33	1.28	2.45
c.Control Deviation(CD)	0	13	13	0.64	0	0.13	1.31	4.33	0.08
CIT	5	10	5	9.20	10	9.71	1.23	-1.46	0.08

TABLE VI.5

TERRITORIAL DECENTRATION TEST: NUMBERS OF SUBJECTS CLASSIFIED IN EACH TERRITORIAL DECENTRATION STAGE (TDS) BY AGE, SEX AND REGION

(N = 270)

	Age	11		12		13		14		15		16		17		18		19		20	
	Sex / Stage	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1	3	8	2	1	6	3	8	11	0	4	1	8	9	0	0	0	0	0	0	0	0
Nairobi	2	3	5	3	6	0	2	1	1	1	1	2	4	0	0	0	0	0	0	0	0
N = 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	3	1	0	2	4	5	5	11	9	3	5	5	6	8	5	4	4	0	0	1	0
Kiambu	2	0	0	1	2	0	2	1	1	2	3	0	0	0	0	0	0	0	0	0	0
N = 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	3	0	0	0	2	3	5	13	3	1	10	11	5	8	11	4	1	3	0	2	1
Narok	2	0	0	0	2	0	0	0	1	0	0	0	2	0	1	0	0	0	0	0	0
N = 90	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE VI.6

TERRITORIAL DECENTRATION TEST : NUMBERS AND PERCENTAGES* OF ALL SUBJECTS CLASSIFIED IN EACH TDS. BY SEX AND AGE

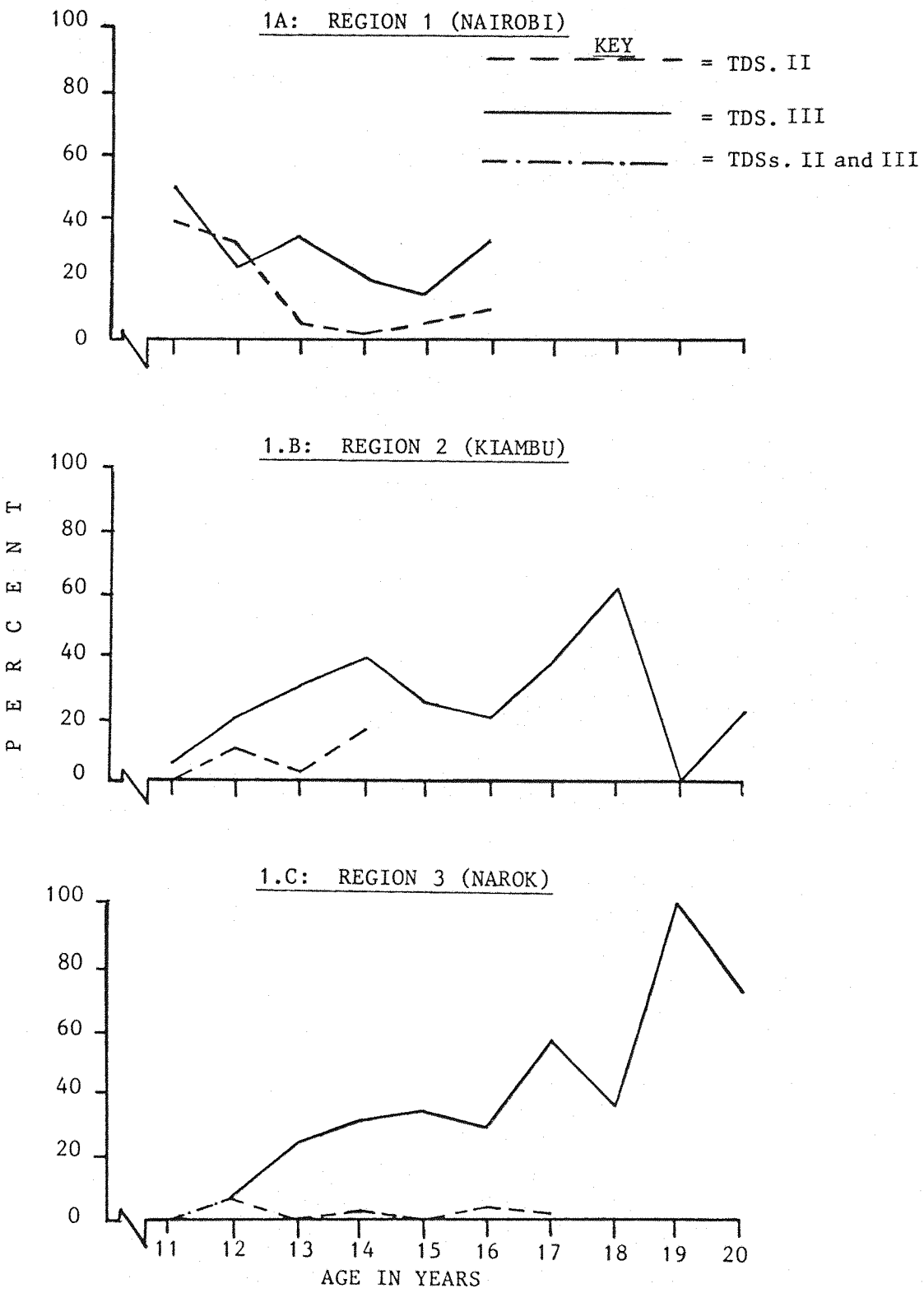
(N = 270)

Age Grp. & Sex. / T.D. Stage	11 M	11 F	12 M	12 F	13 M	13 F	14 M	14 F	15 M	15 F	16 M	16 F	17 M	17 F	18 M	18 F	19 M	19 F	20 M	20 F	Total M	Total F	OVERALL TOTALS
3	09	02	03	12	11	18	35	12	08	16	23	21	17	15	08	05	03	0	03	01	120	102	222
	75	25	42.86	54.55	100	81.82	94.59	80	72.73	80	92	77.78	100	93.75	100	100	100	0	100	100	88.89	75.56	82.22
2	03	05	04	10	0	04	02	03	03	04	02	06	0	01	0	0	0	0	0	0	14	33	47
	25	62.5	57.14	45.45	0	18.18	5.41	20	27.27	20	8	22.22	0	6.25	0	0	0	0	0	0	10.37	24.44	17.41
1	0	01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01	0	01
	0	12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.74	0	0.37
Overall Column Totals	12	08	07	22	11	22	37	15	11	20	25	27	17	16	08	05	03	0	03	01	135	135	270
%ges of M&F Ss. by age groups	60	40	24.14	75.86	33.33	66.67	71.15	28.85	35.48	64.52	48.08	51.92	51.52	48.48	61.54	38.46	100	0	75	25	100	100	100

* All percentages are shown below the respective numbers of subjects in each age group

FIGURE VI.1.A, B and C*

TDT: PERCENTAGES OF SUBJECTS IN REGIONS 1, 2 AND 3 CLASSIFIED IN TDSs. II AND III[a] BY AGE (N = 270[a])



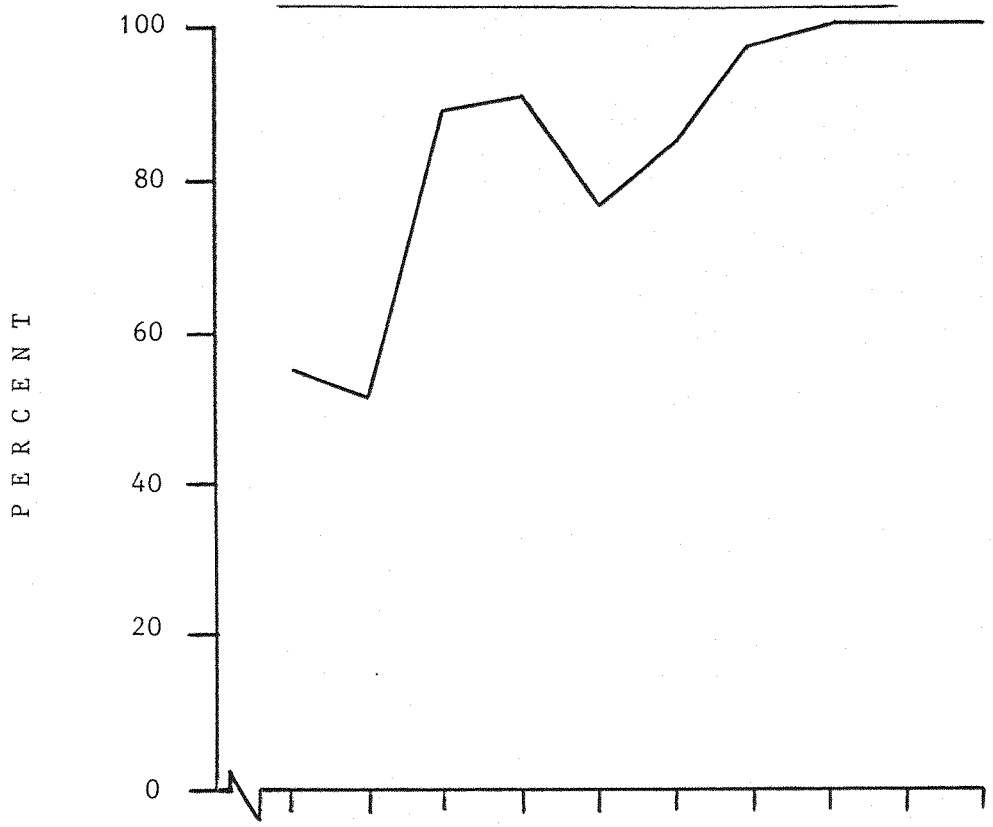
Notes: * These graphs are based on data shown in Appendix VI .1, page486 .

a. Only one (1) eleven-year-old female subject from Region 3 was classified in TDS.I. Thus, this subject and TDS.I were excluded from this graphical presentation and from some of the subsequent statistical analyses of the results of this study.

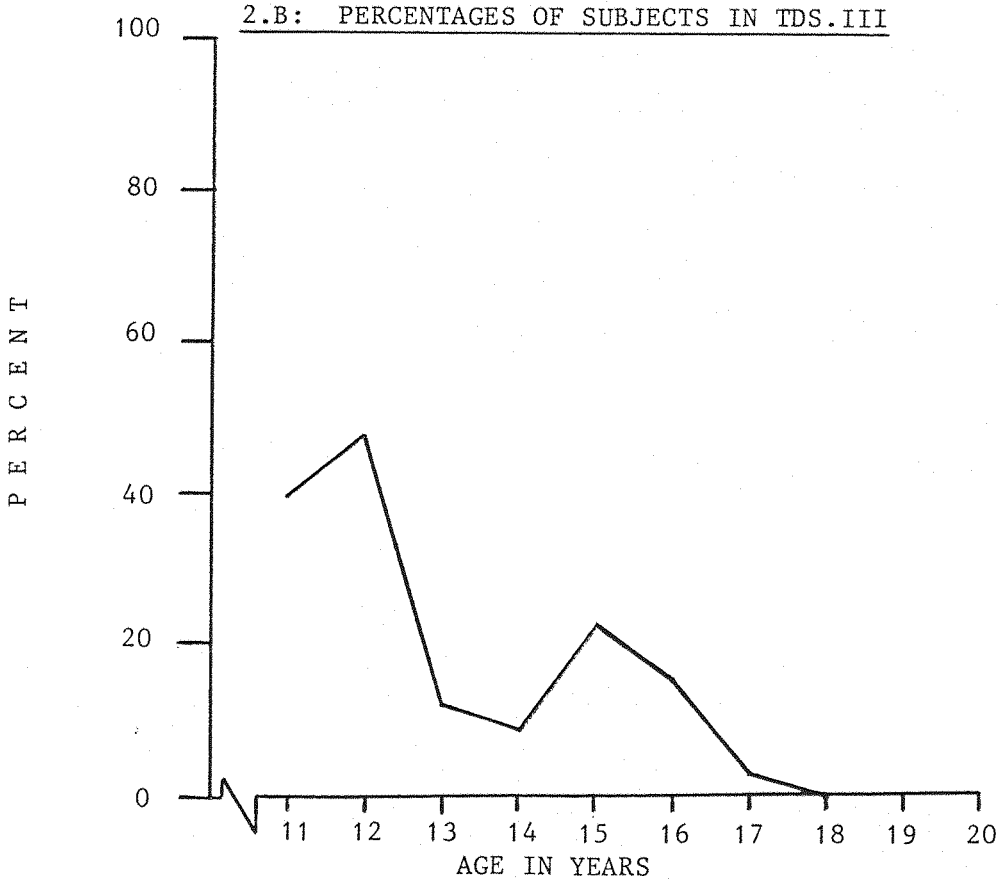
FIGURE VI.2.A AND B

TDT: PERCENTAGES OF ALL SUBJECTS CLASSIFIED IN TDSs. II AND III BY AGE (N = 270[a])

2.A: PERCENTAGES OF SUBJECTS IN TDS.II



2.B: PERCENTAGES OF SUBJECTS IN TDS.III



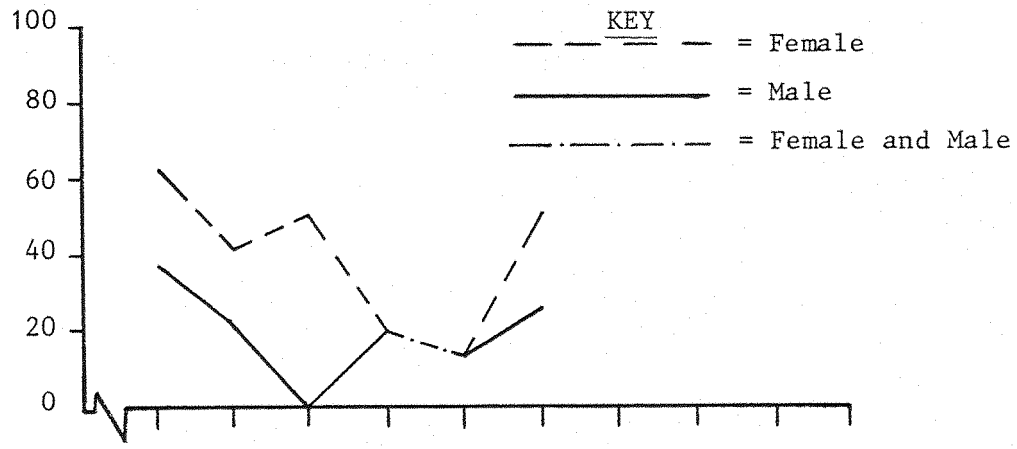
Notes: a. One 11-year-old female subject and the TDS.I she attained were excluded from this graphical presentation.

* These composite graphs are based on data in Appendix VI.2, page 487.

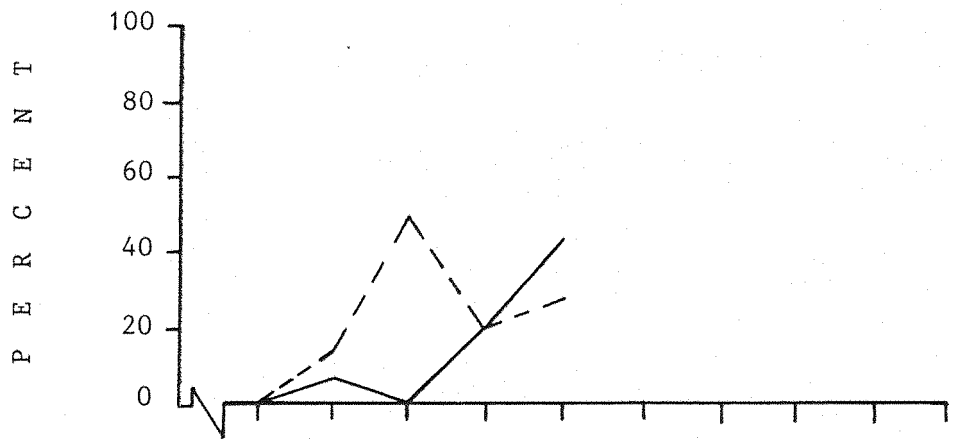
FIGURE VI.3.A.i-iii*

TDT: PERCENTAGES OF SUBJECTS CLASSIFIED IN TDS.II BY SEX, AGE AND REGION (N = 270[a])

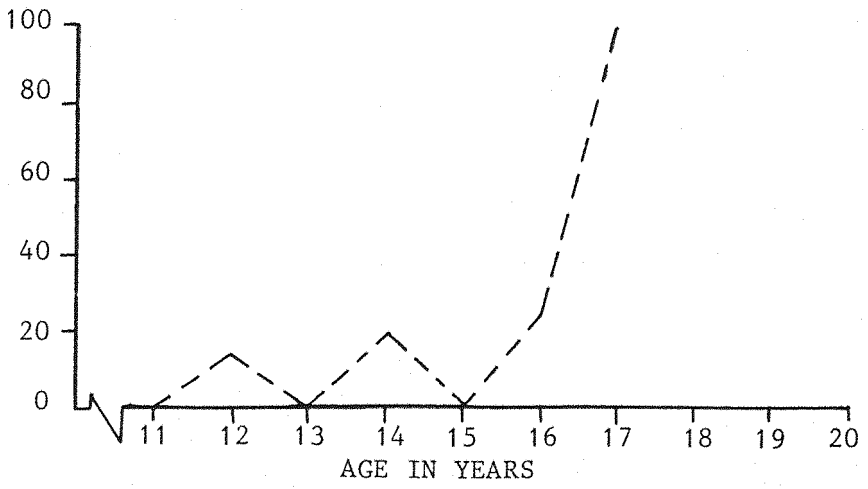
3.A.i: REGION 1 (NAIROBI)



3.A.ii: REGION 2 (KIAMBU)



3.A.iii: REGION 3 (NAROK)



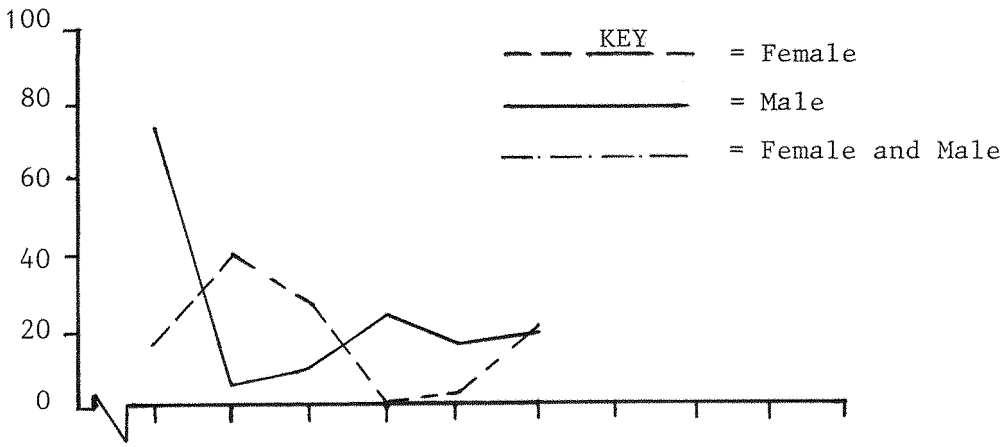
Notes: a. One 11-year-old female subject and the TDS.I she attained were excluded from this graphical presentation.

* These graphs are based on data presented in Appendix VI.3, page 488.

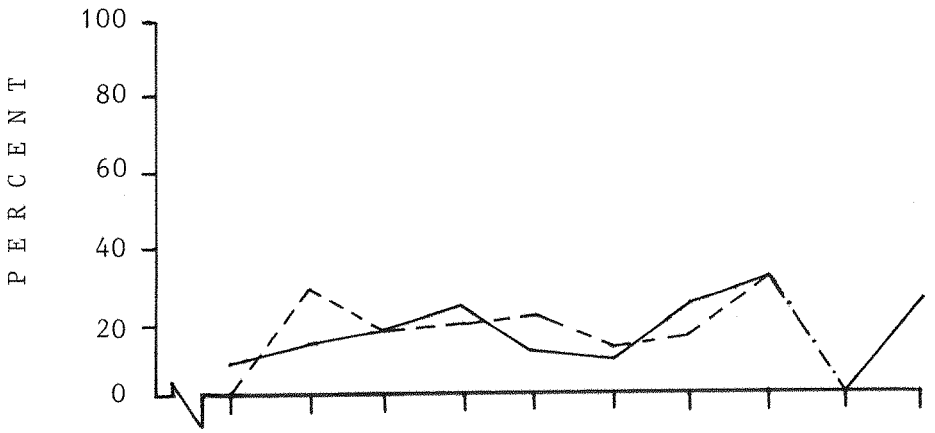
FIGURE VI.3.B.i-iii*

TDT: PERCENTAGES OF SUBJECTS CLASSIFIED IN TDS.III BY SEX, AGE AND REGION (N = 270[a])

3.B.i: REGION 1 (NAIROBI)



3.B.ii: REGION 2 (KIAMBU)



3.B.iii: REGION 3 (NAROK)

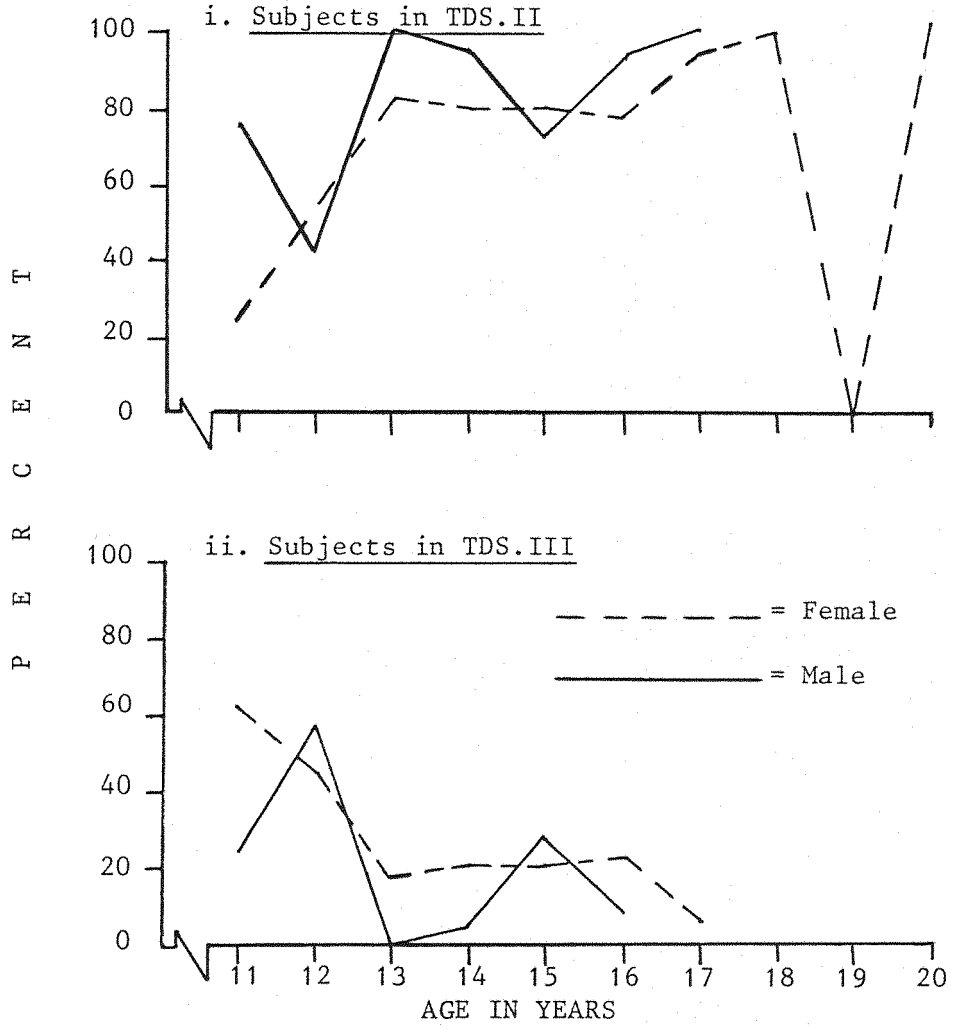


Notes: a. One 11-year-old female subject and the TDS.I she attained were excluded from this graphical presentation.

* These graphs are based on data presented in Appendix VI.3, page 488.

FIGURE VI.3.C. i-ii *

TDT: PERCENTAGES OF SUBJECTS CLASSIFIED IN TDSs. II AND III BY SEX AND AGE: A SUMMARY (N = 270[a])

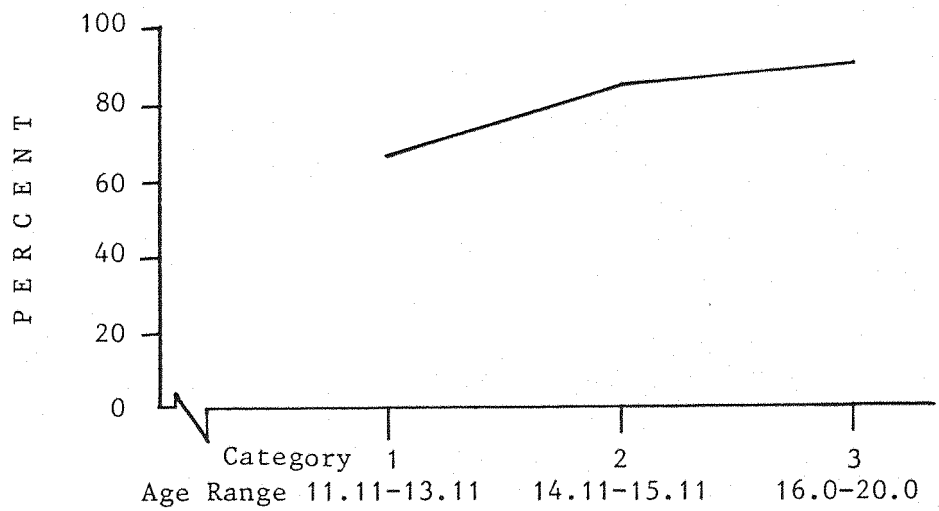


Note: a. One 11-year-old female subject and the TDS.I she attained were excluded from this graphical presentation.

* The graphs in this figure are based on data presented in Table VI.6, page 319.

FIGURE VI.4*

TDT: PERCENTAGES OF SUCCESS IN ATTAINING TDS.III BY AGE-GROUPS (N = 270)



Note: * This composite figure is based on data shown in Appendix VI.4, page 489.

TABLE VI.7

TERRITORIAL DECENTRATION TEST: NUMBERS AND PERCENTAGES OF STUDENTS CLASSIFIED IN TERRITORIAL DECENTRATION STAGE$_{III}$(TDS.3) BY AGE AND REGION

Age	11		12		13		14		15		16		17		18		19		20		TOTAL	
Region/ Sample	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1 Nairobi N = 90	10	90.91	7	46.67	11	37.93	11	23.40	5	20.83	17	38.64	0	0.0	0	0.0	0	0.0	0	0.0	61	67.78
2 Kiambu N = 90	1	9.09	6	40.00	10	34.48	20	42.55	8	33.33	11	25.00	13	40.63	8	61.54	0	0.0	1	25.00	78	86.67
3 Narok N = 90	0	0.0	2	13.33	8	25.59	16	34.04	11	45.83	16	36.36	19	59.38	5	38.46	3	100	3	75.00	83	92.22
Column Total	11	100	15	100	29	100	47	100	24	100	44	100	32	100	13	100	3	100	4	100	222	82.22
Sample Col. Total (N)	20	55	29	51.72	33	87.88	52	90.38	31	77.42	52	84.62	33	96.97	13	100	3	100	4	100	270	100.00

TABLE VI.8

TDT: OBSERVED AGE FREQUENCY DISTRIBUTIONS A, B AND C ACCORDING TO PIAGET'S SPATIAL STAGES AS BASED ON A MODIFIED VERSION (TABLE III.3) OF STOLTMAN'S (1971/1976) HYPOTHETICAL MODEL (N = 270)

AGE-STAGE FIT	AGE CATEGORY	AGE-GROUP RANGE (Years and Months)	FREQUENCIES	STAGES I	II	III	TOTAL IN AGE GROUP
A	1	11.0 - 12.11	0[a]	1	22	30	53
	2	13.0 - 15.11	0	0	16	96	112
	3	16.0 - 20	0	0	9	96	105
	COLUMN TOTALS			1	47	222	270
B	1	11.0 - 13.11	0	1	26	55	82
	2	14.0 - 15.11	0	0	12	71	83
	3	16.0 - 20	0	0	9	96	105
	COLUMN TOTALS			1	47	222	270
C	1	11.0 - 14.11	0	1	31	106	138
	2	15.0 - 17.11	0	0	16	97	113
	3	18.0 - 20	0	0	0	19	19
	COLUMN TOTALS			1	47	222	270

Note: a. O = Observed Age Frequency Distributions

TABLE VI.9

TDT: ESTIMATED PERCENTAGES OF AGE FREQUENCY DISTRIBUTIONS IN EACH AGE-GROUP CATEGORY ACCORDING TO PIAGET'S SPATIAL STAGES AND AGE-STAGE FITS A, B AND C [a]

(N = 269[b])

AGE-STAGE FITS	AGE CATEGORY	STAGES AGE-GROUP RANGES	II	III
A	1	11.0 - 12.11	41.5 (±13.1)[c]	56.6 (± 13.1)
	2	13.0 - 15.11	14.3 (± 6.5)	85.7 (± 6.5)
	3	16.0 - 20	8.6 (± 5.4)	91.4 (± 5.4)
B	1	11.0 - 13.11	31.7 (± 9.98)	67.1 (± 9.98)
	2	14.0 - 15.11	14.5 (± 7.6)	85.5 (± 7.55)
	3	16.0 - 20	8.6 (± 5.4)	91.4 (± 5.4)
C	1	11.0 - 14.11	22.5 (± 6.9)	76.8 (± 6.9)
	2	15.0 - 17.11	14.2 (± 6.4)	85.8 (± 6.4)
	3	18.0 - 20	0 (0)	100.0 (±45.0)

Notes:

a. The data presented in this table were based on calculations of the data shown in Tables III.3 and VI.8.

b. The eleven-year old female subject, who attained TDS.I, was excluded from all the analyses for age-category 1 in the three Age-Stage Fits. Likewise, TDS.I, in which only one subject was classified, was also excluded from these analyses.

c. Figures in brackets are percentage errors which were calculated on a 95 percent standard normal distribution.

TABLE VI.10

TDT: CHI-SQUARE ANALYSES FOR INDEPENDENCE BETWEEN ESTIMATED PERCENTAGE AGE-STAGE FREQUENCY DISTRIBUTIONS A, B AND C (TABLE VI.9) AND PIAGET'S SPATIAL STAGES AS SHOWN IN THE MODIFIED VERSION (TABLE III.3 ABOVE) OF STOLTMAN'S (1971, 1976) HYPOTHETICAL MODEL

(N = 269[a])

AGE-STAGE FITS	AGE CATEGORY	AGE-GROUP RANGE (Years and Months)	FREQUENCIES	STAGES II	STAGES III
A	1	11.0 - 12.11	E[b]	20	10
			O[c]	41.5	56.6
	2	13.0 - 15.11	E	60	20
			O	14.3	85.7
	3	16.0 - 20	E	20	70
			O	8.6	91.4
$\chi^2 = 503.94$*		$d_f = 5$		$p \leq 0.001$	
B	1	11.0 - 13.11	E	20	10
			O	31.7	67.1
	2	14.0 - 15.71	E	60	20
			O	14.5	85.5
	3	16.0 - 20.0	E	20	70
			O	8.6	91.4
$\chi^2 = 594.93$*		$d_f = 5$		$p \leq 0.001$	
C	1	11.0 - 14.11	E	20	10
			O	22.5	76.8
	2	15.0 - 17.11	E	60	20
			O	14.2	85.8
	3	18.0 - 20	E	20	70
			O	0	100
$\chi^2 = 730.83$*		$d_f = 5$		$p \leq 0.001$	

Notes: a. See note (b) below Table VI.8, page 326.

b. Expected Percentage Age Frequency Distributions (see Table III.3 above).

c. Observed Percentage Age Frequency Distributions (see Table III.3 above).

* χ^2 value is significant at the level less than or equal to 0.001.

TABLE VI.11

TDT: A COMPARISON OF THE RESULTS OF THE CHI-SQUARE ANALYSES FOR THE PROBABILITY OF CORRESPONDENCE BETWEEN SELECTED EQUIVALENT PERCENTAGE AGE-STAGE FREQUENCY DISTRIBUTIONS C.3 FOR THE AMERICAN SAMPLE[a] AND A.1 FOR THE KENYAN SAMPLE[b] FOR STAGES II AND III [c]

Sample	Age-Stage Fits	Age Category	Age-Group Range (Years and Months)	Frequencies	Stages II	Stages III
American (N = 204)	C	3	10.7 - 12+	E	20	70
				O	30.2	31.7
	χ^2 = 26.16*			d_f = 3		$p \leq 0.001$
Kenyan (N = 269)	A	1	11.0 - 12.11	E	20	10
				O	41.5	56.6
	χ^2 = 240.27*			d_f = 3		$p \leq 0.001$

Notes: a. The percentages for this analysis were calculated from data collected in Georgia, USA, by Stoltman (1971 and presented in Table 3.C (see Stoltman, 1976b: 54).

b. For the Kenyan sample, the percentages used in this analysis were calculated from data collected and shown by the present author in Tables III.3, VI.8 and VI.9 of this thesis.

c. All the figures shown are percentages obtained as explained in (a) and (b) above.

* The χ^2 value is significant at the level less than or equal to 0.001.

TABLE VI.12

TDT: CHI-SQUARE ANALYSIS FOR THE SIGNIFICANCE OF THE RELATIONSHIP BETWEEN AGE[a] AND THE ATTAINMENT OF TDSs. II AND III (N = 269[b])

Age-Group (Category)	11 - 13 (1)		14 - 15 (2)		16 - 20 (3)		Row Totals	
TDS	n	%	n	%	n	%	n	%
II	26	32.1	12	14.5	9	8.6	47	17.5
III	55	67.9	71	85.5	96	91.4	222	82.5
Column Totals	81	30.1	83	30.9	105	39.0	269	100.0
$\chi^2 = 18.31$*			$d_f = 2$				p = 0.0001	

Notes: a. For purposes of this χ^2 test analysis, ages 11 to 20 were re-grouped into 3 categories, as shown in the table.

b. The 11-year-old female subject and the TDS.I she attained were excluded from this analysis. Thus, 269 was the overall total used to calculate the percentages in this table.

* The computed χ^2 value is significant at the level equal to 0.0001.

TABLE VI.13

TDT: CHI-SQUARE ANALYSIS FOR THE SIGNIFICANCE OF THE RELATIONSHIP BETWEEN SEX DIFFERENCES AND THE ATTAINMENT OF TDSs. II AND III (N = 269[a])

Sex	Female		Male		Row Totals	
Category	0		1			
TDS	n	%	n	%	n	%
II	33	24.6	14	10.4	47	17.5
III	101	75.4	121	89.6	222	82.5
Column Totals	134	49.8	135	50.2	269	100.0
χ^2 = 8.52*			d_f = 1		p = 0.004	

Note: a. The only 11-year-old female subject, who came from Region 3 and attained TDS.I, was excluded from this analysis, just as was TDS.I. Thus, 269 was the overall total used to calculate the percentages in this table.

* The computed χ^2 value is significant at the 0.004 level.

TABLE VI.14

TDT: CHI-SQUARE ANALYSIS FOR THE SIGNIFICANCE OF THE RELATIONSHIP BETWEEN GRADE OR YEAR OF SCHOOLING AND THE ATTAINMENT OF TDSs. (N = 269[a])

Grade	Standard VI		Form 1		Form 3		Row Totals	
TDS	n	%	n	%	n	%	n	%
II	22	24.7	16	17.8	9	10.0	47	17.5
III	67	75.3	74	82.2	81	90.0	222	82.5
Column Totals	89	33.1	90	33.5	90	33.5	269	100.0

$\chi^2 = 6.73^*$ $\quad d_f = 2$ $\quad p = 0.035$

Note: a. The only 11-year-old female subject, who was in Standard VI and attained TDS.I, was excluded from this analysis, just as was TDS.I. Thus, 269 was the overall total used to calculate the percentages in this table.

* The computed χ^2 value is significant at the 0.035 level.

TABLE VI.15

TDT: CHI-SQUARE ANALYSIS FOR THE SIGNIFICANCE OF THE RELATIONSHIP BETWEEN SESP[a] AND THE ATTAINMENT OF TDSs. (N = 269[b])

SESP	Professionals		Non-Professionals		Row Totals	
Category	1		2			
TDS	n	%	n	%	n	%
II	32	25.8	15	10.3	47	17.5
III	92	74.2	130	89.7	222	82.5
Column Totals	124	46.1	145	53.9	269	100.0
χ^2 = 10.04*			d_f = 1		p = 0.002	

Notes: a. For purposes of this analysis, the SESP categories shown in Table III.4, page 144, were re-grouped as followed: I through IV = 1 (Professionals); V, VI and 0 (Don't Knows) = 2 (Non-professionals).

b. The only 11-year-old female subject, who came from Region 3, belonged to SESP category 2 (VI) and attained TDS.I, was excluded from this analysis, just as was TDS.I. Thus, 269 was the overall total used to calculate the percentages in this table.

* The computed χ^2 value is significant at the 0.002 level.

TABLE VI.16.A AND B

TDT: CHI-SQUARE ANALYSIS FOR THE SIGNIFICANCE OF THE RELATIONSHIP BETWEEN THE PEERE AND THE ATTAINMENT OF TDSs.III AND II[a]

(N = 269[b])

TABLE VI.16.A: FOR TDS. III

Region/ Sample	N	Attainment of TDS.III	
		Number of Subjects	Percentage
1. Nairobi	90	61	67.8
2. Kiambu	90	78	86.7
3. Narok	89	83	93.3
Column Totals and Average Percentage	269	222	82.5
χ^2 = 3.60*		Degrees of Freedom = 2	

* Not significant at the 0.05 level.

TABLE VI.16.B FOR TDS. II

Region/ Sample	N	Attainment of TDS.II	
		Number of Subjects	Percentage
1. Nairobi	90	29	32.2
2. Kiambu	90	12	13.3
3. Narok	89	6	6.7
Column Totals and Average Percentage	269	47	17.5
χ^2 = 18.17*		Degrees of Freedom = 2 $p \leq 0.01$	

Notes: a. The one 11-year-old female subject who attained TDS.I came from Region 3 (Narok). Hence, the sub-total number of 89 and an overall total of 269 subjects (Note (b)) shown in this table. This subject and TDS.I were excluded from the analyses of the data presented in the table.

* The χ^2 value is significant at the level less than or equal to 0.01.

TABLE VI.17

CORRELATIONS BETWEEN SOME OF THE VARIABLES IN THE RESEARCH INCLUDING THE DEPENDENT VARIABLE TDTT

(N = 270)

	AGE	SCDT1	SCDT2	SCDTT	PRFTR	PRFTL	PRFTT	CD	CIT	TDTB	TDTE	TDTT
AGE	- -											
SCDT1	0.017	- -										
SCDT2	0.162**	0.362**	- -									
SCDTT	0.124*	0.749**	0.889**	- -								
PRFTR	-0.027	-0.168**	-0.068	-0.131*	- -							
PRFTL	0.008	-0.141*	-0.126*	-0.159**	0.570**	- -						
PRFTT	0.012	-0.178**	-0.113	-0.168**	0.868**	0.893**	- -					
CD	0.146*	-0.086	-0.153*	-0.151*	0.220**	0.208**	0.243**	- -				
CIT	0.035	0.058	0.199**	0.170**	-0.190**	-0.207**	-0.219**	-0.140*	- -			
TDTB	0.367**	0.125*	0.141*	0.162**	-0.065	0.019	-0.021	0.130*	-0.042	- -		
TDTE	0.332**	0.091	0.144*	0.147*	-0.056	0.035	-0.006	0.115	-0.041	0.887**	- -	
TDTT	0.362**	0.113	0.146*	0.160**	-0.063	0.026	-0.015	0.127*	-0.042	0.979**	0.963**	- -

Notes: * = $p \leq 0.05$ (Critical level of correlation coefficient = ± 0.120; see Note VI.4.3, page 312).
$p \leq 0.01$ (Critical level of correlation coefficient = ± 0.157; see Note VI.4.3, page 312).

SCDT1 = Space Concept Test Part 1
2 = " " " " 2
T = " " " " Total Score
PRFTR = Portable Rod-and-Frame Test: Sum of Deviations to the Right in degrees
L = " " " " " : " " " " " Left " "
T = " " " " " : " " " " " Right and Left "
CD " " " " " : Control Deviation Score

CIT = Class Inclusion Test
TDTB = Territorial Decentration Test (Behavioural)
TDTE = Territorial Decentration Test (Explanation)
TDTT = Territorial Decentration Test (Total Score)

TABLE VI.18

THE REGRESSION OF TDTT ON AGE

(N = 270)

Variable	Source of Variation (S.V.)	Estimated Regression Coefficient (β)	Sums of Squares (S.S.)	Mean Square (M.S.)	Standard Error of β	F Value	Level of Significance (ρ level)
Age	Regression	0.706	587.73	587.73	0.111	40.35	≦ 0.05
	Residual/Error		3903.74	14.57			

Degrees of Freedom = 1 and 268

TABLE VI.19

THE REGRESSION OF TDTT ON AGE AND SCDTT

(N = 270)

Variables	Source of Variation (S.V.)	Estimated Regression Coefficient (β)	Sums of Squares (S.S.)	Mean Square (M.S.)	Standard Error of β	F Value	Level of Significance (ρ level)
Age	Regression	0.678	648.00	324.00	0.111	37.06	≦ 0.05
SCDTT	Residual/Error	0.249	3843.47	14.40	0.122	4.19	≦ 0.05

Degrees of Freedom = 1 and 267

TABLE VI.20

PROPORTION OF VARIATION IN TDTB, TDTE AND TDTT EXPLAINED BY AGE AND AGE PLUS ALL OTHER VARIABLES IN THE REGRESSION (N = 270)

Independent Variables	Dependent Variable TDT (Behavioural)	TDT (Explanation)	TDT (Total)
Age	0.135	0.110	0.131
	(14%)	(11%)	(13%)
Age plus all other variables	0.172	0.143	0.168
	(17%)	(14%)	(17%)

CHAPTER VII

IMPLICATIONS OF THE STUDY AND RECOMMENDATIONS FOR FURTHER RELATED RESEARCH

VII.0 Introduction

The need to discuss the main implications of this study for the curricula in school geography and geographical education in Kenya was expressed in Chapter II.5.5, page 101. Thus, against the background of the findings and conclusions made in the preceding chapter, and after presenting a number of general comments and observations, this seventh chapter focusses on discussing the study's implications and, consequently, on making some suggestions for further related research.

VII.1 Some General Comments and Observations

Given the restricted compass of this study, it would see presumptuous to attempt a detailed discussion of the general problem of curriculum planning in geography. For a recent and authoritative coverage of the various aspects of this problem, reference may be made to Graves (1979). Nevertheless, what this study can attempt is a discussion of the implications of the results of the research on the DTD for the planned curricula in school geography and geographical education in Kenya. The term "planned curricula" is used here to refer broadly to the official documents which clearly outline the aims of particular courses, the content, the teaching/learning units, for which objectives and instructional strategies are expected to be specified, and the course evaluation process (see also Graves, 1979: 13).

To provide a basis for understanding the implications outlined below, it is necessary to take account of the following points:

1. As was described in Chapter IV, the institutions charged with the general responsibilities for the planning, development and evaluation of the geography curricula in primary and secondary schools in Kenya are respectively the KIE and KNEC. However, the actual work of curriculum development is done by subject panels under the auspices of the bodies named above. The members of the panels are usually representatives

of the school geography teachers, education inspectorate, teacher training college tutors, university geography lecturers and teacher educators, and education officers.

2. The planned geography curricula are implemented throughout Kenya's primary and secondary schools by teachers of geography. Though the majority of geography teachers in the government-aided schools are professionally trained and qualified, most of the "harambee" and similar private schools still depend on the services of untrained teachers. Nevertheless, as was noted in Chapter IV, measures are being taken to provide the untrained teachers with opportunities for undergoing the necessary academic and professional training in Kenyan teacher education institutions.

3. The staff from the Education Inspectorate are responsible for ensuring that the planned curricula in school geography are properly implemented. In this regard, the inspector(s) of schools for geography play an important linking role between school teachers of geography and the officials responsible for the development of the geography curricula.

4. The official practice in Kenya's formal education system is to assign pupils to the various school grades (standards or forms) regardless of their intellectual abilities, and socio-economic, tribal and/or regional backgrounds. As would be expected, boys and girls are taught together in all the co-educational schools which seem to outnumber the single sex schools available in the country. The heterogeneous nature of the population of pupils in the various grades represents one of the most challenging problems with which every school teacher in Kenya has to deal.

5. As was noted in Chapter IV, the primary and secondary teachers of geography are educated and trained in different teacher education institutions. With very few exceptions, all primary school teachers expected to teach geography, or social/environmental studies, are prepared in the primary teachers' colleges (PTCs). The colleges are centrally controlled by the relevant board of teacher education studies at the KIE. Some of the teachers of geography in the upper primary

standards (VI to VII) and most of those teaching the subject in the lower secondary forms (I to II/III) are trained at the KSTC. The curriculum offered in this college is the responsibility of both the KIE and the KUC. All the upper secondary (Forms III to IV) and sixth form geography teachers and tutors of geography in the PTCs are trained at KUC and/or in equivalent overseas teacher education institutions. As with the rest of the university courses, the curriculum in geographical education for undergraduate and post-graduate students is controlled by the Board of the Faculty of Educational Studies on behalf of the University College Council and Senate.

6. As is generally the case in other countries, the parents of the school pupils are expected, as members of Kenyan society, to play their part in ensuring that their children are properly educated within the limits of the available resources.

7. As discussed in Chapter VI, the results obtained from this investigation revealed the existence of general differences in the rates and stages of the DTD amongst the various sub-groups within the sample of Kenyan African school children. For example, it was found that subjects from the same region of residence, school grade and sex progressed at varying rates. This finding seems to tie in with the point made above about the heterogeneity of the backgrounds of the pupil populations in the various school grades from some of which the subjects in the present sample were drawn.

8. Further to the results discussed in Chapter VI and referred to above, the present investigator undertook personal observation of the subjects' behaviour during the interviewing sessions. He later followed these observations with a closer examination of the subjects' protocols. Evidence from these observational exercises showed that:

a. Whereas some of the subjects interviewed could correctly verbalise the identities of the territories and their relationships, these subjects lacked the ability to display <u>real comprehension</u> of those territories and the relationships involved. They neither could identify the correct outline maps representing the relevant territorial units nor could they manipulate the representative props to show the necessary correct relationships;

b. While the majority of the subjects were able to identify the nation-state of Kenya from the range of nation-state outline maps, some of them could not justify their response(s). There was a general tendency for subjects in the latter category to display ignorance of the geographical territorial units inside and outside the boundaries of Kenya either verbally or through the manipulation of representative props and/or the use of the range of outline maps provided.

VII.2 Some Implications for Planned Curricula in School Geography and Geographical Education in Kenya

Against the background of the foregoing general comments and observations, it is possible to identify some of the major implications for planned curricula in school geography and geographical education in Kenya, as outlined below.

VII.2.A Some Implications for the Planning, Development, Evaluation and Renewal of Curricula in School Geography in Kenya

2.A.1 The results indicated that the subjects in the Kenyan sample progressed through, and attained, different TDSs. It would thus seem advisable and practically feasible to design the composition of the curricula in school geography in Kenya in a series of sequences which are based upon the observed age-stage developments. This would imply the need to determine the various development levels of the learners concerned and then to base decisions for curriculum development planning and renewal on the information obtained.

In view of the above, a suggested sequence in organising the content of curricula in school geography in Kenya would be to include topics for study which are selected from, and may therefore be actually observed in, the "local area", and then to proceed concentrically to the study of other more distant areas and more abstract or complex concepts. This is especially important in planning the curricula for children in the primary and lower secondary school grades. As was discussed in Chapters I and II, most of these pupils, who are aged between 7 and 11½ years, are mainly in the stage of "concrete operational thought" and tend to depend on their personal experiences and observations of concrete examples

of elements in their local environment for the development of various simple geographical concepts (see also Graves, 1979: 58). By applying the principle of "working from the known to the unknown", Kenyan school pupils may be enabled to develop more realistic concepts and understandings of systematic geography since they are able to refer to concrete examples in the local environment before being introduced to more abstract concepts. The example outlined below may help to illustrate this point within the Kenyan context.

Prior to the introduction of the "regional concepts" of Kenya and/or East Africa to the learners, it may be advisable to start with a study of the "school and its immediate environs", following this with a study of the "location or sub-county" as a larger environment in which the child's home and school are situated. The range of topics to be covered might include: the location's position, size, simple relief and drainage features (hills, valleys and streams or rivers); political divisions (administrative boundaries of sub-locations); weather and climate (direction of winds, wet and dry seasons); natural and man-made vegetational types and their spatial distribution; other resources (food and cash crops, livestock and minerals); population (numbers and distribution of people, ways of life: dwellings, food, clothing, ornaments and social activities); economic activities (subsistence and commercial farming activities; the influence of local weather and climate on the farming activities; trade and such other commercial activities as fishing and local industrial production - pottery, mat-making, brickwork and basketry); town/urban settlements and markets; and transport and communications. These topics could then be covered for the local district/county, the province and then for Kenya and the whole of East Africa.

Between the ages of 11½ and 15 years, adolescent pupils are said to be generally capable of abstract, hypothetico-deductive thinking and reasoning about the objects, events and situations in the local and distant environments. This is due to the emergence of "propositional or formal operational thought" and the increase in decentration which gradually free the adolescent from concrete operational modes of thought and behaviour. Thus, as Graves (1979: 58) went on to observe for school geography:

> ...It is during this stage that some "concepts by definition" can be successfully introduced (for example, the location quotient), where relationships of a slightly more complex nature may be taught (for example, the decision of a farmer to specialise in dairy farming is a result of his perception of the interplay of such factors as soil, climate, market and government policy), and where somewhat more complicated skills may be introduced (for example, proportional divided circles).

Nevertheless, it is considered essential for planners of the geography curriculum for secondary schools in Kenya to stress the importance of studying geographical elements and concepts in the local environment to facilitate understanding of those in more remote areas. Thus, for example, a study of wheat farming in the Rift Valley Province of Kenya may lead to a comparative study of large-scale wheat farming in the North American Plains or in Australia, New Zealand and South America. Likewise, concepts associated with the work of such major rivers as the Nile or the Amazon (for example, erosion, transportation and deposition of the load, problems of flooding, and the various ways in which the river may be used by man, for instance, irrigation and the generation of hydro-electric power) may be introduced gradually to the students through studies of such local rivers as the Tana, Nzoia and Athi. Through such processes, it may be possible to ensure that pupils are helped to learn geographical concepts which they can cognitively comprehend in more realistic ways.

2.A.2 As was discussed in Chapter IV, a great deal of importance is attached to such public examinations as the CPE, KJSE, KCE and KACE by all concerned with the Kenyan pupils' education, including potential employers. In the light of the results of this study, appropriate measures may be taken to ensure that questions are incorporated in the various geography papers set in the examinations named above to facilitate the process of determining the extent to which learners may have been able to grasp and apply the various geographical concepts introduced to them within the general framework of the concept of TD. For instance, the questions set should objectively encourage the pupils to display clear understanding of certain geographical concepts through the use of examples taken from the local environment wherever possible, and to reveal ability to apply the geographical skills they may have developed in a given course. To achieve this, it may be advisable to

set questions in which as much information as possible is provided to the examinees for analysis and interpretation. This would help to discourage rote learning. The information provided may be in the form of statistical data, a series of photographs, maps and/or case studies. At the primary school level, objective testing (including "matching of items", "true/false", "multiple choice" questions and those requiring completion through the insertion of missing key words and/or terms) should be used more frequently than the essay-type of questions because of the limited ability of younger pupils to express their ideas in prose form. However, at higher levels, it should be possible to use a combination of objective and essay-type questions, and to include an assessment of project work undertaken by the candidates in their local environments.

VII.2.B Some Implications for the Implementation of the Curricula in School Geography in Kenya

2.B.1 In teaching geography in primary and secondary schools in Kenya, there seems to be increased need for teachers to be more aware of their pupils' different abilities and levels of intellectual development as discussed in Chapters I and II and as the results reported in Chapter VI indicated. Equipped with this information, teachers should then proceed to use activities and techniques which fully exploit the learners' abilities at the different stages of development.

2.B.2 Learners in Kenyan schools should more frequently be exposed to reality (the real phenomena in the local environment or samples and examples) to facilitate their (learners') comprehension of the various geographical concepts to which they are being introduced. This calls for increased emphasis on the use of practically-oriented approaches to teaching geography. Organised fieldwork in the school's local environment (for example, a field study of the local market, stream, farm, factory or town) may not only enhance the development of skills of observation and recording geographical information but also give the pupils the necessary personal experience of the environment required in the formation of concepts which aid the process of DTD. The use of such secondary sources of information as survey maps, slides, films/filmstrips, photographs and case studies may supplement the work done in the field

and help to introduce pupils to the study of the geography of more distant environments.

The results of this investigation indicated that there are differences in TD amongst children. For example it was discovered that while boys are more territorially decentred than girls, older subjects and those from higher school grades were more territorially decentred than their counterparts in the younger age-groups and in the lower school grades. Evidence also appeared to indicate that subjects from the urban environment were less territorially decentred than those in the semi-rural and remote rural regions of Kenya. All these findings seem to emphasise the need for geography teachers in Kenya to be aware of the fact that some of the pupils they teach in the "mixed-ability grouping" classes may not always possess personal experiences which are essential for the DTD. Hence, the greater need for geography teachers in Kenya to use some of the activities and techniques suggested above to enable their pupils to acquire the experiences necessary for the attainment of TD and thereafter the development of the various geographical concepts.

2.B.3 Teachers of geography and/or the related social/environmental studies should attempt to introduce geographical concepts to their pupils systematically following a planned sequence. This sequence may start from the learners' own home or school environment and extend gradually outwards to cover such wider and more distant environments as the country, East African region, African continent and the rest of the world. A further suggestion would be to design a school teaching syllabus based on the concentric model of progressive territorial decentration which was described in Chapter II.2.C, pages 56-58, and illustrated in Figure II.1, page 57. This approach would help to ensure that the concepts of "nation-state" and/or the "world" are introduced to the learners with reference to local geographical territories or environments, and that their (territories') spatial interrelationships are properly comprehended by the Kenyan learners. Thus, as has been found in previous related research (for example, Oliviera, 1976), the use of the concept of TD in teaching and learning of geography in Kenyan schools as illustrated above may prove to be a useful model by which concepts of national unity and international understanding or consciousness might be presented according to the learners' various stages of TD.

In attempting to enhance the development of international understanding amongst learners using the model named above, Kenyan geography teachers may do well to note the definitive view succinctly expressed by Scarfe (1978: 87) in the following words:

> ....International understanding does not mean that we should aim at inducing all people to like all other people. It does not mean that we should adopt or try to emulate the ways of other people. But it does mean that we should try to promote a comprehension of the ways of life, the values, the aspirations of all peoples of the world, and that we should try to achieve an understanding of the requirements for living together peaceably on this planet. In this sense, understanding includes the necessity of comprehending our own ways of living as well as the ways of other people. In short, international understanding is the ability to observe and to appraise critically and objectively the conduct of men everywhere irrespective of nationality or culture....

VII.2.C Some Implications for the Curricula in Geographical Education in Kenya

One of the questions with which Scarfe (1968) dealt in his discussion of the problem of international understanding is one of producing geography teachers who are so genuinely conscious of, and enthusiastic about, international goodwill that they are able to use geography to promote in the pupils the same feelings. He specifically asked the question: 'How do we find or train teachers who are internationally minded?', and went on to maintain that since international goodwill (and/or consciousness) is taught by example and contagion, 'if we can provide such internationally minded teachers, then we may get international goodwill in schools....' (Scarfe, 1978: 86).

The foregoing remarks and the findings of this study about the Kenyan subjects' DTD seem to have two major implications for the curricula in geographical education in Kenya, as outlined below.

2.C.1 Appropriate measures should be taken by the staff responsible for the curricula in geographical education at KUC and in the PTCs throughout Kenya to ensure that student teachers of geography are properly prepared to deal with the various problems they are likely to encounter in teaching geography in schools. For example, teacher educators may

need to stress to their student teachers the importance of, firstly, using the concept of TDSs. to determine the various conceptual levels at which their pupils are operating so as to gain an understanding of the problems some of the pupils tend to experience in learning certain geographical concepts. This implies that teacher educators in Kenya may need to examine critically the extent to which the concept of TD dealt with in this study may be used effectively as an instructional model in the geographical education and training of teachers of geography.

Secondly, teacher educators need to introduce student teachers of geography to those methods and techniques of teaching geography which not only utilise the concept of TD as an instructional model but also help to rectify the imbalances in the amount of personal experiences various pupils may have of their real environments. To illustrate this further, student teachers may be helped to appreciate why it is that girls, pupils in the urban environments, those in lower grades and, in Kenya's case, children coming from higher SES parental backgrounds tend to be less territorially decentred, as the results of this study appeared to indicate. Thereafter, the teacher educators may lay emphasis in their courses on the use of such instructional methods as the organised geographical fieldwork excursions, the local area studies, the inductive approach (sample or case studies), and/or the extraction of geographical information from such secondary sources as text-books, audio-visual sources (films, filmstrips,photographs and slides). Just as student teachers or teachers of geography may be expected to make the study of the school's local environment a central theme in helping their pupils to develop geographical concepts in a more realistic and interesting way, so would one expect lecturers and tutors in geographical education in Kenya to use local studies, such as "Kahawa and its environs" in the case of KUC, for introducing methods of teaching geography to pre-service undergraduate and postgraduate student teachers of geography. (Kahawa is the local area in which the KUC campus is situated, about 15 kms to the north of the City of Nairobi).

2.C.2 The final implication is the necessity to mount in-service training courses along the lines of those outlined above for practising teachers so as to equip these teachers with the expertise neces-

sary to handle such problems as have been discussed above which pupils experience in learning some of the geographical concepts which may be introduced through the conceptual framework of TD. These courses would also be beneficial to the majority of the untrained teachers who are currently teaching in some of Kenya's schools as was discussed in Chapter IV. In designing the content of these courses, teacher educators may need to consider the individual needs of practising teachers who may have expressed interest in undergoing the course(s) of training. This information may be collected by administering exploratory questionnaires to teachers throughout the "catchment school areas" of the various teacher education institutions in Kenya prior to mounting the courses.

VII.3 Recommendations for Further Related Research

The findings and conclusions made in Chapter VI indicated several areas of study which call for further related research and investigation. These areas and the specific recommendations are as outlined below.

VII.3.1 Some Sampling Procedural Considerations

The subjects interviewed in this research were selected in equal numbers according to sex, grade and region of residence but not according to age and SESP. As a result, since the numbers of subjects in some of the individual age and SESP categories were very small, several categories hardly had any subjects in them. This rendered unnecessarily long and cumbersome the tasks of statistical processing and analysis of the results. Thus, to avoid such a problem in future related research, the suggestion stated below is advanced for consideration:

Recommendation 1:

> To facilitate statistical processing and interpretation of research data, equal numbers of subjects in future samples should be selected, wherever possible, according to such descriptive variables as sex, age, grade, region of residence and SESP of the subjects.

3.2 The Problem of Sample Age Ranges

As noted earlier in this thesis, this study's subjects were aged between 11 and 20 years. In contrast, the ages of the subjects studied in earlier related investigations ranged from about 6 to 12 years.

The restrictions discussed in Chapter II.7 of the thesis militated against the selection of subjects younger than 11 years to participate in this study. Thus, with the exception of the age range of 11 to 12 years, it was not possible to determine, inter alia, the applicability of Piaget's spatial stages theory to the subjects in the age range of 6 to 10 years. Nevertheless, some useful results emerged from the present examination of the major trends in, and of Piaget's (1972) phenomenon of the cultural relativism of the developmental endpoint of, the DTD amongst Kenyan school adolescent pupils. In future, however, the need to investigate the DTD in a sample of younger subjects in an African setting cannot be overemphasised. Such a study might help to provide more empirical information about the general problem of the relationship between age and the DTD, especially at the ages lower than 11 years. Hence, the two related suggestions stated below:

Recommendation 2.a.

> Appropriate measures should be taken to overcome the problems of linguistic communication and "cultural distance" between the investigator(s) and subjects so as to ensure that subjects are selected from all age ranges to participate in future related studies.

b. To ensure a more effective and comprehensive testing of the universality (or applicability) and generalisability of Piaget's spatial stages theory and findings from other related studies, Kenyan subjects aged 6 years and beyond should be selected to participate in future investigations of the DTD.

3.3 The Relationship between Sex Differences and the DTD

The discovery of the existence of statistically significant differences between the sexes in the attainment of TD underlined the importance of the factor of sex differences in the DTD. It was found that the boys in the Kenyan sample were more territorially decentred than the girls. While this finding was in line with Jahoda's (1963 a and b), it was noted that such other earlier investigators as Jaspars et al. (1965), Oliviera (1976) and Stoltman (1971, 1976a) found no significant differences between the performance of boys and girls in their respective samples.

In view of the discrepancies in the findings reported so far, there seems to be further need to investigate the relative influence of sex differences in future studies of the DTD amongst subjects aged 6 years and beyond. Such studies would fulfil two main purposes. Firstly, they may help to determine whether or not the present findings and conclusions are also valid for other Kenyan samples. Secondly, by including subjects younger than 11 years, it may be possible to determine whether or not the performance differences observed amongst the Kenyan subjects aged 11 to 20 years can be observed amongst much younger boys and girls. Hence, the following suggestion:

Recommendation 3:

> In view of the discrepancies in the findings reported so far from related cross-cultural studies on the DTD, the relative influence of the factor of sex differences in the DTD requires further examination in future related investigations.

3.4 The Relative Effects of Grade or Year of Schooling in the DTD

One of the unique aspects of this study is that, unlike earlier related investigations, it made the first attempt to examine the relative influence of the subjects' grade or year of formal schooling in their DTD. The results showed that the DTD improves as the grade increases. This led to two related conclusions. Firstly, it was observed that formal educational instruction undergone by learners in the various school grades apparently influences their DTD. Secondly, it became clear that in such a country as Kenya where the child's grade is not always dependant upon his/her chronological age, the factor of "school age" plays a very important role in the determination of their DTD. Thus, given that the study undertaken of the relative effects of subjects' grade is a relatively new dimension in the research on the DTD, there is further need to investigate it so as to determine whether or not the present findings are valid for other samples.

Recommendation 4:

> Undertaking a further study of the relative effects of the subjects' school grade or year of formal education in their DTD may help to determine whether or not the present findings and conclusions are equally valid for other research samples.

3.5 The Influence of PEERE in the DTD

This study's results revealed the existence of some differences in the performance of the 270 Kenyan subjects who were drawn from the urban (Nairobi), semi-rural (Kiambu) and remote rural (Narok) regions of Kenya. These differences were, however, not entirely statistically significant ($p \leq 0.05$). Two main conclusions were drawn from this finding. First, the factor of PEERE of the subjects appeared to be generally influential in their DTD. Second, it was noted that the more "open" rural environment appears to play a more important role than the more "closed" urban environment in enhancing the DTD amongst the subjects concerned.

It was argued in Chapter II.7, page 111, that a study in this research of subjects from a wider range of physical and eco-cultural environmental regions of Kenya would probably have helped to determine whether or not their (subjects') stages and rates of the DTD are similar to those actually observed amongst the present Kenyan sample. Nevertheless, the constraints discussed in Chapter II.7, pages 111 - 116, militated against undertaking such an exercise in this investigation. Hence, the recommendation stated below.

Recommendation 5:

> An extension of this research to include subjects with different experiences of such environments as the inland Lake Victoria basin and the Indian Ocean coastal region of Kenya may help to determine the extent to which those subjects' stages and rates of the DTD are similar to those observed amongst the present Kenyan sample.

3.6 The Relationship between SESP and the DTD

The results showed that Kenyan African subjects from the lower non-professional SESP category (2) were more territorially decentred than those from the higher professional SES parental background. This finding was in sharp contrast to the theoretical predictions and to the results reported respectively by Jahoda (1963a) and Stoltman (1971, 1976a) for their Scottish and American samples.

Given the foregoing contrasting results from otherwise related investigations, it is considered necessary to examine further the effects of SESP in the subjects' DTD.

Recommendation 6:

> A study of the influence of the subjects' SESP in their DTD should be undertaken in future research to determine further the extent of the relationship between these two variables.

3.7 It may be recalled that in response to Stoltman's (1971: 59) suggestion, this research attempted, for the first time, to examine the relationship between such Piagetian tasks as the SCDT and the performance of the subjects on the TDT (see Chapter III.7, pages 151-153). In addition, such other variables as Witkin's FD-FI cognitive style dimension of psychological differentiation and the operational logical class inclusion ability of the subjects were examined to determine their relative influence in the subjects' DTD.

Two points can be noted from the foregoing, namely:

a. This study made an attempt to break new ground in research on the DTD by investigating the variables named above; and

b. The results from testing the last 2 null hypotheses appeared to be statistically inconclusive, as was discussed in Chapter VI.

On account of the controversial nature of the reported finding, it would seem reasonable to suggest that more attention be paid to an investigation of the extent of the relationships between the above-named variables and the DTD in future studies.

Recommendation 7:

> Further attempts should be made in future related studies to examine the extent of the relationships between Witkin's FD-FI dimension of cognitive style of psychological differentiation and the operational logical class inclusion ability of the subjects and their DTD.

3.8 As was discussed in Chapter II.2.a, pages 54-56, the present research did not deal, in terms of Piagetian psychology, with the cognitive-affective and emotional aspects of the child's attachment to a given territory or "local patriotism" or "nationalism" (Piaget, 1928; and Piaget and Weil, 1951). It was concerned with studying the children's spatial or territorial cognition of political territories and relationships so as to determine their attainment of the concepts of a nation

and, correspondingly, of international understanding or consciousness.

In view of the foregoing observation, it is suggested that a parallel study of the cognitive-affective and emotional aspects of the child's attachment to a given territory be undertaken. Such a study may help to provide further information about the children's development of international attitudes. In terms of experimental organisation, this study could be designed along the lines of the research undertaken in the Netherlands by Jaspars et alii (1965).

Recommendation 8:

> A parallel study of the cognitive-affective and emotional aspects of the children's attachment to a given territory may help to provide information about their development of "local patriotism" or "nationalism" and international attitudes (for example, the perception of other nations, countries and international relations - see Jaspars et al. 1965: 2).

3.9 Finally, as was noted in Chapter IV, a large section of the population of Kenya still depends on the non-formal education institutions and agencies for some basic and/or continuing education. The need for this section of Kenya's society to be aware of the importance of the government's concern for creating and promoting feelings of national unity and international goodwill amongst Kenyan citizens is as great as that expressed above for the pupils and students in the country's institutions of formal education. In view of the foregoing remarks, it may be suggested that the staff in the non-formal educational institutions and agencies examine ways in which they may use the concept of TD as a tool or model for enhancing the development of national unity and international consciousness amongst their course participants. Hence, the final recommendation stated below.

Recommendation 9:

> The personnel responsible for the development and implementation of curricula in non-formal education in Kenya should undertake to explore ways in which the concept of TD may be used in their courses to facilitate the creation and promotion of feelings of national unity and international understanding amongst their course participants.

VII.4 Summary

Within the compass of this seventh chapter, a number of general comments and observations were made to provide a basis for understanding the implications discussed later. Subsequently, the main implications of this research for the curricula in school geography and geographical education, and for general education in Kenya were discussed. The specific areas considered in this respect were: the planning, development, evaluation and renewal of the school geography curricula; the implementation of the planned curricula in geography by teachers in the primary and secondary schools in Kenya; and the curricula in geographical education for the professional pre- and in-service training of geography teachers at KUC and in the PTCs throughout Kenya. Finally, nine (9) problems upon which interest in future related research may be focussed were then suggested for further investigation. Results from these studies may be expected to contribute to an extension of the existing knowledge about the development and application of the concept of territorial decentration.

The following and last chapter of this thesis will be concerned with presenting a summary of the main aspects of the work undertaken in this research.

CHAPTER VIII

SUMMARY OF THE RESEARCH

VIII.0 Introduction

This final chapter summarises the work undertaken in the present research and reported in this thesis. The main areas of the research thus outlined will be: a re-statement of the problem; the theoretical background; experimental and methodological considerations, including the results and conclusions; implications for curricula in school geography and geographical education in Kenya; recommendations for further related research; and, finally, a general conclusion indicating the distinctive qualities of this study.

VII.1 A Re-statement of the Research Problem

The problem investigated in this research was the development of territorial decentration (DTD) in children with particular reference to the study of Piaget's (1928, 1951) spatial stages theory and in relation to the curricula in school geography and in the geographical education and training of student teachers in the Republic of Kenya.

"Territorial decentration" (TD) was defined in operational terms as the process through which one broadens one's centre of spatial or territorial interest from the self-centred household compound and family environments to such more decentred geo-political territories as the village, town, district, province, city, nation and world. The term "decentration" was used to refer to the act of extending one's spatial or territorial perspective or world outwards from the centre, or the waning of spatial egocentricity (after Piaget (1928), Piaget and Weil (1951), Piaget and Inhelder (1956) and Stoltman (1971, 1976a)). Thus, a "territorially decentred subject" is one who has acquired the operational notions or concepts of the relevant territories and an understanding of their correct spatial relationships. This research specifically confined itself to investigating the subjects' spatial cognition of political territories and their relationships.

The general field of knowledge within which this study was undertaken was the interface of the disciplines of psychology (Piagetian), geography

and geographical education. This was so due to the common interest these disciplines seem to share in studying the problems relating to territorial or spatial dimension of reality.

VIII.2 The Theoretical Background of the Research

VIII.2.1 The Conceptual Framework

As discussed in Chapter I, while Piaget's stage-dependent theory of cognitive development formed the general conceptual framework within which this research was undertaken, the specific problem investigated was derived from the studies carried out in: Switzerland by Piaget (1928) and Piaget and Weil (1951); in Scotland by Jahoda (1963, 1964) and Marsh (1966); in the USA by Stoltman (1971, 1976a); and in Brazil by Oliviera (1976). A critical overview of Piaget's work involved a consideration of the characteristics of his theory, the factors influencing the sequence of the development of the structures of human thought as stipulated within the Piagetian system, the four Piagetian global stages of the development of intelligence, and of some of the main critical observations so far made about Piaget's theory. In addition, the rest of the related studies cited above were also examined in Chapter II. This reviewing process helped to determine the current status of cross-cultural research on the DTD.

Two other important points emerged from the review of pertinent research literature, namely that:

a. Noteworthy attempts are being made in Kenya to modernise and localise the curricula in, inter alia, school geography and geographical education (see Chapter II.3, pages 59-69).

b. Several cross-cultural psychological studies replicating Piaget's work on conservation, classification, seriation and space concept development had been carried out in Kenya, Tanzania and Uganda. Nevertheless, evidence could not be found to suggest that similar attempts had so far been made by geographers and geographical educationists to investigate the DTD in relation to Piaget's Spatial Stages theory and with specific reference to curricula in geography and geographical education in Kenya.

2.2 The Research Questions

Against the foregoing background, this investigation specifically addressed itself to the following two research questions:

2.2.1.a. By what processes and stages are Kenyan African children able to acquire the concept of the nation-stage of Kenya in its spatial aspects?

b. What are some of the factors which influence the processes and rates of the DTD in Kenyan African children?

2.2.2. What are the main implications of the possible answers to the questions stated above for the planning, implementation, evaluation and renewal of the curricula in school geography and in the geographical education and training of student teachers in Kenya?

2.3 The Dependent and Independent Variables Studied in the Research

The DTD was identified as this study's dependent variable and was operationalised by the total scores and the territorial decentration stages (TDSs) attained by the subjects on the Territorial Decentration Test (TDT). The independent variables investigated to determine the extent to which they influence the DTD were the subjects' age, sex differences, grade or year of schooling, SESP, level of spatial concept development, perceptual ability or differentiation, level of operational logical reasoning ability, and of their physico-ecologico-cultural environmental and residential experience (PEERE).

2.4 Purposes of the Study

This research undertook to fulfil the following purposes through a replication and extension of earlier empirical studies carried out in other countries within the Kenyan context:

1. To contribute towards attempts being made to acquire functional knowledge about the Kenyan African children's cognitive and logical development through an empirical investigation in the subject interface of Piagetian psychology, geography and geographical education in Kenya.

2. To provide a basis for understanding the processes through which, and rates at which, Kenyan children acquire and apply the concepts of space and TD to develop spatial notions of the concept of the nation-state of Kenya.

3. To contribute towards an understanding of the relative significance of some of the factors which influence the development of the concept of TD.

4. To attempt a comparison of the results of this study with the findings of similar earlier investigations to determine as far as is possible the universality or applicability and generalisability of the theories and tests developed and used in those studies.

5. To identify, state and discuss some of the implications of the major results of this research for the processes of the planning, implementation, evaluation and renewal of the curricula in school geography and in the geographical education and training of student teachers in Kenya.

2.5 Nature of the Investigation

A survey of the main types of educational research revealed that this study is cross-cultural and replicational in nature. In addition, it possesses characteristics which are typical, in varying degrees, of the cross-sectional, survey or descriptive, experimental, observational, clinical or case study and/or correlational categories of educational research.

2.6 Limitations of the Study and Suggestions for Overcoming the Constraints

The six major limitations to the scope of the study were: (1) the restricted period of time in which the research had to be completed; (2) financial limitations; (3) the problem of accessibility to the primary and secondary sources of information about the original and subsequent studies which this study sought to replicate and extend; (4) the problems of linguistic communication and some sub-cultural differences

between the investigator and his research subjects; (5) practical organisational problems; and (6) the restrictions associated with the theoretical and methodological features and requirements of earlier related studies. The various methods adopted to overcome these constraints so as to strengthen the authenticity and effectiveness of the scope, findings and recommendations of the study were discussed in Chapter II.7

2.7 The Research Hypotheses

On the basis of the statements of rationale of the research and of the research hypotheses which were outlined in Chapter III, nine (9) a priori hypotheses were set up in null form. These were then tested to determine the extent of the relationships between the independent variables named in VII.2.3 above and the DTD in the Kenyan sample. It was hypothesised that:

H_1- ... the respective use of Age-Stage Fits A, B and C will reveal that there is no significant difference between Piaget's (1928, 1951) Spatial Stages and the stages and rates of the DTD in a sample of the Kenyan African children;

H_2- ... there is no significant relationship between age and the DTD in Kenyan African children;

H_3- ... there is no significant relationship between sex differences and the DTD in Kenyan African children;

H_4- ... there is no significant relationship between the grade or year of formal schooling and DTD in Kenyan African children;

H_5- ... there is no significant relationship between the SESP of Kenyan children and their DTD;

H_6- ... there is no significant difference in the DTD between Kenyan African children drawn from the remote rural, open grassland and least-carpentred environment of Region 3 (Narok); the peri-urban, high plateau, sub-humid, forested and more "closed" landscape of Region 2 (Kiambu); and the built-up metropolitan urban and most carpentred-world environment of Region 1 (Nairobi);

H_7- ... there is no significant relationship between the level of the development of space concept or the effectiveness of spatial judgment, as measured by Laurendeau and Pinard's (1970) standardised version of Piaget and Inhelder's (1956) "Three Mountains Co-ordination of Perspectives Task (SCDT)", and the DTD in Kenyan African children;

H_8- ... there is no significant relationship between the FD-FI cognitive style dimension of psychological differentiation, as determined according to their performance on the PRFT, and the DTD, as determined according to their performance on the TDT, in a sample of Kenyan African children;

H_9- ... there is no significant relationship between the operational logical class inclusion ability of the Kenyan African children and their DTD.

VIII.3 Experimental and Methodological Considerations of the Research

VIII.3.1 The Setting of the Research in Kenya

The setting of this research in Kenya was described in Chapter IV. This involved a consideration of, inter alia, the country's locational, areal, ecological and socio-economic features, and the historical, organisational and developmental aspects of her education system. In outlining the main features of the education system, emphasis was placed on describing the formal education from which the subjects in the research sample were selected.

3.2 The Research Sample and Sampling Procedure

The research subjects were 270 (135 boys and 135 girls) Kenyan African children, aged between 11 and 20 years and selected in equal numbers (15 boys and 15 girls) from each of the alternate grades of Primary Standard VI (1) and Secondary Forms I (2) and III (3) of the participating 3 primary and 4 secondary schools. This sample was drawn from a total research population of 3,884 school children of whom 2,006 (51.65 per cent) were boys and 1,878 (48.35 per cent) were girls. This research population was comprised of the total enrolments for 1980 in the above-named 7 schools. Thus, this sample accounted for 7 per cent of the total research population in comparison to Stoltman's (1971, 1976a) American sample of 204 subjects which constituted 8.9 per cent of his research population of 2,292 children. Ninety (90) subjects (45 boys and 45 girls) in the Kenyan sample were drawn from each of the three different regions: Nairobi (1), Kiambu (2) and Narok (3). The research population and sample were stratified five (5) ways according to the following background variables: age, grade or year of

schooling, sex, PEERE, and SESP. The numbers of subjects in some of the individual age categories were too small for statistical processing of the research data. Thus, all the age categories were re-grouped into 3 main "age-group categories", namely, 11 to 13, 14 to 15, and 16 to 20.

3.3 The Process and Procedures of Research Instrumentation

The instrumentation process through which the empirical data for the research were collected was described in Chapter V. These methods were as follows:

3.3.1 The Background Questionnaire and Interview Schedule

A short background questionnaire was administered to all the subjects who were also later individually interviewed by the investigator. The purpose of these procedures was to collect personal background information directly from the subjects themselves. This information was used to test some of the research hypotheses.

3.3.2 The Research Instruments

As discussed in Chapter V.3, the four (4) research instruments or tasks adopted and used, mutatis mutandis, in the study were:

3.3.2.i. The Territorial Decentration Test (TDT) (After Stoltman (1971, 1976a)):

Purpose: To determine in operational terms the Kenyan subjects' DTD and concept of territory, and the comparability of Piaget's Spatial Stages to that development. The test, which was the study's main criterion measure, has the following four (4) Sub-tests:

Sub-test A: Verbal Territorial Identification:

Purpose: To assess the children's verbal knowledge of territorial titles and familiarity with map representations of the same territories.

Sub-test B: Verbal Territorial Relationship:

Purpose: To determine the children's conception of the relationship of one territory to another verbally.

Sub-test C: Territorial Inclusion Using Written Symbols:

Purpose: To ascertain the presence, or absence, of territorial inclusion principles in the children's reasoning.

Sub-test D: Territorial Inclusion Using Props:

Purpose: To test the children's development of territorial relationship through the performance of several operations, and their ability to explain and justify their decision through the prop placement process.

3.3.2.ii. The Three Mountains Co-ordination of Perspectives Task (SCDT) (After Piaget and Inhelder, 1956; Satterly: 1964, 1977; Laurendeau and Pinard, 1970; Garner and Plant, 1972; and Omari, 1977):

Purposes: a. To assess the ability of the children to restructure a view from a point in space different from their own in untimed conditions.

b. To assist in defining operationally the process of spatial conceptualisation and/or the level of the effectiveness of spatial judgment amongst the research subjects.

3.3.2.iii. The Portable Rod-and-Frame Test (PRFT) Witkin (1950), Witkin et al. (1962/74) and Oltman (1968):

Purpose: To determine operationally the subjects' standing on the FD-FI cognitive style dimension of psychological differentiation.

3.3.2.iv. The Class Inclusion Test (CIT) (After: Inhelder and Piaget (1964); Opper (1971, 1977); Dasen and Ngini (1978); and Otaala, 1973)):

Purpose: To determine, independently from the TDT, the subjects' operational logical understanding of the relations of subclasses to overall classes in the class inclusion system by using items which are different from the territorial units and props directly employed in the TDT.

3.4 Techniques of Data Presentation and Analysis

As shown in Chapter VI, such descriptive statistics as frequencies, percentages, means, modes and standard deviations of the test results

and the various stages of attainments by the subjects were presented in tabulated and/or graphical form and then examined. To test the a priori hypotheses, which were derived from previous related cross-cultural research on the DTD, the geographic and geographical education perspectives, and from a consideration of the Kenyan subjects' physico-eco-cultural background, the research data were analysed using various statistical techniques, as shown below:

4.a. Hypotheses 1 to 6, which were based on such categorical data as age-groups, sex differences, grades, regions of residence, PEERE and SESP, were tested using Chi-squared tests.

4.b. The techniques of simple correlation and stepwise regression analyses were applied to such numerical data as the age of the subjects and their scores on the SCDT, PRFT, CIT and TDT so as to test hypotheses 2, 7, 8 and 9. The SPSS Programme: Release 8.1 was run on Southampton University's ICL 2970 Computer to perform the necessary statistical analyses of the research data.

3.5 Results of the Research

3.5.1 While out of a total research sample of 270 subjects, 222 (82.22 per cent) successfully attained TDS.III, which is the final formal operational level of TD, and 47 (17.41 per cent) were classified in transitional TDS.II, only one (1) (0.37 per cent) eleven-year-old female subject attained TDS.I.

3.5.2 Though the Kenyan subjects passed through the same sequence of TDSs. as the Piagetian Spatial Stages observed earlier amongst Swiss, Scottish, American and Brazilian children, the rates of stage attainment were different. The χ^2 values of 503.94, 594.93 and 730.83, which were respectively obtained for Age-Stage Fits A, B and C, with 5 degrees of freedom, were found to be significant well beyond the 0.05 level. The weight of this statistical evidence favoured the rejection of the first null hypothesis with specific reference to the rates of the DTD. While the Kenyan subjects generally attained the various TDSs. at greater chronological ages than their above-named counterparts, they tended to enter these stages at ages earlier than those predicted in Stoltman's (1971, 1976a) hypothetical model of Age-Stage Fits A, B and C.

3.5.3 While the greatest number of subjects (96 or 91.4 per cent) who attained TDS.III were in the oldest age-group category of 16 to 20 years, the smallest number (55 or 67.9 per cent) were from the youngest age-group category of 11 to 13 years. The χ^2 tests, correlation and stepwise regression analyses of the data revealed statistically significant evidence ($p \leq 0.05$) which led to the rejection of the second null hypothesis.

3.5.4 The χ^2 test revealed the existence of statistically significant differences between the sexes in the attainment of TD. The χ^2 value of 8.52 was obtained, with 1 degree of freedom, and found to be significant beyond the 0.05 level. The third null hypothesis was thus rejected. While a greater number or percentage of girls (33 or 24.6%) than boys (14 or 10.4%) was classified in transitional TDS.II, more boys (121 or 89.6%) than girls 101 or 75.4%) attained TDS.III.

3.5.5 Whereas only 67 subjects (that is, 75.3 per cent) from Primary Standard VI attained TDS.III and 74 or 82.2 per cent were in Secondary Form I, the greatest number (81 or 90.0 per cent) of the territorially decentred subjects came from Secondary Form III. The χ^2 value of 6.73, which was obtained and found to be significant beyond the 0.05 level, with 2 degrees of freedom, led to the rejection of the fourth null hypothesis.

3.5.6 In terms of the SESP, 130 subjects (89.7 per cent) classified in the non-professional workers' category (2) attained TDS.III and only 92 subjects (74.2 per cent) from the professional workers' category (1) were classified in this formal operational stage of the DTD. These differences were confirmed by the χ^2 value of 10.04 which was obtained, with 1 degree of freedom, and was found to be significant well beyond the 0.05 level. Hence, the rejection of the fifth null hypothesis.

3.5.7 While the greatest number and percentage of territorially decentred subjects in the sample (83 or 93.3 percent) were from the remote rural and open grassland environment of Region 3 (Narok), the smallest number (61 or 67.8 per cent) of the most successful performers on the TDT were from the relatively more "closed and carpentred-world" environment of the Nairobi urban region (1). With a total number (78

or 86.7 per cent) of the most successful performers on the TDT, the semi-rural, relatively "closed" mountainous and forested environment of the Kiambu region (2) occupied the intermediate position in the attainment of TDS.III. Though these results showed that a relationship might well exist between the PEERE of the subjects and their attainment of TDS.III, the χ^2 test results fell short of statistical significance at the 0.05 level. However, a higher χ^2 value of 18.17 was obtained and found to be significant at the 0.05 level, with 2 degrees of freedom, when the test was applied to the numbers of subjects classified in TDS.II. This indicated a very high degree of significance in the different results obtained from the subjects' attainment of this stage within the three different regions. Therefore, though the evidence favoured the rejection of the sixth null hypothesis, this evidence was not statistically conclusive.

3.5.8 The computed F value of 4.19, obtained from the stepwise regression of age and SCDTT with TDTT, with 1 and 267 degrees of freedom, was found to be significant at the 0.05 level. Thus, the seventh null hypothesis was rejected at the 0.05 level of statistical significance.

3.5.9 Despite further stepwise regression analyses of the research data, no statistically significant evidence emerged to favour the rejection of hypotheses 8 and 9 in their null form.

3.6 Conclusions of the Study

3.6.1.a. Just as Stoltman (1971, 1976a) discovered for his American sample, statistically significant differences were found in existence between Piaget's (1928, 1951) Spatial Stages and the rates of the attainment of TDSs by the Kenyan subjects.

1.b. The results obtained seem to call into question the validity of the timing stipulated in Stoltman's (1971, 1976a) hypothetical model of Age-Stage Fits A, B and C as applied to such a non-American sample as that of the Kenyan African children interviewed in this research.

3.6.2. The Kenyan subjects' DTD increased proportionately with their increasing chronological age. Thus, age appears to be a signifi-

cantly contributing factor in the DTD. Similar conclusions had been reached by Piaget (1928, 1951), Jahoda (1963a), Stoltman (1971, 1976a) and Oliviera (1976).

3.6.3 The boys in the Kenyan sample were more territorially decentred than the girls. This seems to confirm the present investigator's view that the differences in the experiences of the environment and in the types of duties performed by Kenyan African boys and girls exert their influence in causing the sex differences discovered in the attainment of TD. While Jahoda (1963a, 1963b) drew a similar conclusion from his study of Scottish children, Jaspars et al. (1965), Stoltman (1971, 1976a) and Oliviera (1976) found no significant differences between the sexes in the performance of their subjects.

3.6.4 The attainment of TD amongst the subjects interviewed was found to be improving systematically with increasing grade or year of formal schooling. This seems to indicate that curricula of formal educational instruction so influence the DTD that, other factors being equal, subjects in the higher grades tend to be more territorially decentred than their counterparts in the lower grades.

3.6.5.a. In sharp contrast to theoretical predictions, Kenyan African children from the lower non-professional SESP category (2) were found to be more territorially decentred than those in the sample who came from the higher professional SES parental background. Jahoda (1963a) and Stoltman (1971, 1976a), however, discovered that children from the middle class and/or higher socio-economic parental backgrounds in Glasgow (Scotland) and Georgia (USA) outperformed those from lower "working class" socio-economic backgrounds respectively.

3.6.5.b. The majority of the Kenyan subjects in the non-professional SESP category, and those who were found to be the most territorially decentred, came from the remote rural (Narok) and, to a limited extent, from the semi-rural (Kiambu) regions. In contrast, while the urban region of Nairobi had the greatest concentration of children from the higher professional SESP backgrounds, it also produced the greatest number of the least territorially decentred subjects. It was thus possible to conclude that such opportunities for operating in the open environment as are available to the children of lower SES parental

backgrounds and, to a certain degree, the traditional life-styles which are still prevalent in rural Kenya, all seem to help those children to develop a greater degree of TD than their urban counterparts.

3.6.6.a. The factor of PEERE of the subjects plays an important part in their DTD.

3.6.6.b. Just as Marsh (1966) discovered from her Scottish investigation, it was possible to conclude that the Kenyan (open) rural environment (Narok District) plays a more important role than the "closed" urban environment (Nairobi) in enhancing the development of TD and the related spatial relationships amongst the individuals concerned. However, it may be recalled that Stoltman (1971, 1976a) did not find any such differences in the performance of his urban and rural American subjects.

3.6.7 As Piaget and Inhelder (1956) maintained, the waning of spatial egocentricity through the development of space concept was found to be crucial to an individual's increasing comprehension and differentiation of territorial or spatial reality in a tri-dimensional schema. The Kenyan subjects' performance on the SCDT and TDT led to the conclusion that their DTD was greatly influenced, inter alia, by their development of space concept.

3.6.8 On account of the statistically inconclusive results of the correlation and stepwise regression analyses of the data from the TDT and PRFT, it was concluded that the factor of Witkin's FD-FI cognitive style dimension of psychological differentiation did not seem to be influential in the DTD amongst the sample of Kenyan African subjects.

3.6.9 The results of the correlational and stepwise regressional analyses of the subjects' scores on the CIT and TDT led to the acceptance of the ninth null hypothesis ($p \leq 0.05$) and, consequently, to the conclusion that the Kenyan subjects' operational logical class inclusion ability was not apparently influential in their DTD.

3.6.10 Finally, the four (4) possible factors accounting for the differences observed in the stages and rates of the DTD amongst the

Kenyan African children and some of their counterparts interviewed in earlier related studies were identified as:

3.6.10.a. The data collection methods, though similar to those used by Stoltman (1971, 1976a) and Oliviera (1976), were substantially different from those originally employed by Piaget and his associates (1928, 1951) in Switzerland and later by Jahoda (1963a and b) and Marsh (1966) in Scotland.

3.6.10.b. The variations in the statistical techniques of data analyses might also have played a part in causing some of the discrepancies named above. The point was also made that Piaget and his associates neither subjected their data to rigorous statistical treatment nor did they control age and response sets in the determination of spatial stages amongst the Swiss subjects. Nevertheless, as Stoltman (1976b: 49) explained, the magnitude of the statistical values (for example, χ^2 values) could be indicative of differences in basic assumptions, as discussed in Chapters III, V and VI, and not the result of differences in statistical procedures.

3.6.10.c. The differences in the characteristics of the samples and in the sampling procedures used in the studies concerned.

3.6.10.d. The cultural differences evident between the countries concerned.

VIII.4. Implications of the Research

VIII.4.A.1 Given that the subjects in the Kenyan sample progressed through, and attained, different TDSs., it would seem advisable and practically feasible to design curricula sequences which are based upon the observed age-stage developments. Working closely with school geography teachers, subject panellists should attempt to determine the various developmental levels of the learners concerned. These officials may then base their decisions for curriculum development planning and renewal on the information obtained.

4.A.2 In the light of the importance attached to such public examinations as the CPE, KJSE, KCE and KACE, appropriate measures may be taken to ensure that questions are incorporated in the various geography examination papers which would help to determine the extent to which learners may have been able to grasp and apply the various geographical concepts introduced to them within the general framework of TD.

4.B.1 There seems to be increased need for primary and secondary geography teachers in Kenya to be more aware of their pupils' different abilities and levels of development. This type of information may help teachers to plan and use appropriate instructional activities and techniques which fully exploit the learners' abilities at the different developmental stages.

4.B.2 Learners should be more frequently exposed to reality to facilitate their comprehension of the various geographical ideas and concepts. This may be done through the use of the local environment, organised geographical fieldwork sessions, a wide range of audio-visual teaching/learning resources, and/or the teachers' or learners' personal experiences. Teachers should be aware of the fact that some of their pupils (for example, girls and children living in the urban environments) often lack the necessary experiences of the real environment. These children, therefore, may need greater assistance and encouragement from their teachers and parents to enable them to acquire the experiences necessary for the development of the relevant geographical concepts.

4.B.3 Teachers of geography and the related social/environmental studies should try to introduce geographical knowledge to their pupils systematically following a planned sequence. This sequence may start from the learners' own home or school environment extending gradually outwards to cover such wider and more distant environments as the country, East African region, African continent and the rest of the world. A further suggestion would be to design a school teaching syllabus based on the concentric model of progressive territorial decentration. This would help to ensure that the concept of nation-state is introduced to the learners with reference to local geographical territories or environments, and that their (territories') spatial relationships are properly comprehended by the learners.

4.B.4 The use of the concept of TD in geography teaching/learning in schools in Kenya may prove to be a useful model by which national unity and international understanding or consciousness might be presented according to the learners' developmental stages.

4.C.1 The staff responsible for the curricula in geographical education at KUC and in the PTCs. should take appropriate measures to ensure that student teachers of geography are properly prepared to deal with the various problems they are likely to encounter in school geography teaching. These teacher educators may try to examine the extent to which the concept of TD may be effectively used as an instructional model in curricula in geographical education in their institutions.

4.C.2 Finally, in-service training courses may be mounted for practising teachers so as to equip them with the expertise necessary to handle some problems which pupils experience in learning some of the geographical concepts which may be introduced through the conceptual framework of TD.

VIII.5 Recommendations for Further Related Research

On the basis of the findings and conclusions made in this study, the problems outlined below were recommended for further related research and investigation.

5.1 To facilitate statistical processing and interpretation of research data, equal numbers of subjects in future samples should be selected, wherever possible, according to such descriptive variables as sex, age, grade, region of residence and SESP of the subjects.

5.2.a. Appropriate measures should be taken to overcome the problems of linguistic communication and "cultural distance" between the investigator(s) and subjects so as to ensure that subjects are selected from all age ranges to participate in future related studies.

b. To ensure a more effective and comprehensive testing of the universality (or applicability) and generalisability of Piaget's spatial stages theory and findings from other related studies, Kenyan subjects aged 6 years and beyond should be selected to participate in future investigations on the DTD.

5.3 In view of the discrepancies in the findings reported so far from related cross-cultural studies on the DTD, the relative influence of the factor of sex differences in the DTD requires further examination in future related investigations.

5.4 Further investigation of the relative effects of the subjects' school grade or year of formal education in their DTD may help to determine whether or not the present findings and conclusions are equally valid for other research samples.

5.5 An extension of this research to include subjects with different experiences of such environments as the inland Lake Victoria basin and the Indian Ocean coastal region of Kenya may help to determine the extent to which those subjects' stages and rates of the DTD are identical to those observed amongst the present Kenyan sample.

5.6 A study of the influence of the subjects' SESP in their DTD should be undertaken in future research to determine further the extent of the relationship between these two variables.

5.7 Further attempts should be made in future related studies to examine the extent of the relationship between Witkin's FD-FI dimension of cognitive style of psychological differentiation and the operational logical class inclusion ability of the subjects and their DTD.

5.8 A parallel study of the cognitive-affective and emotional aspects of the children's attachment to a given territory may help to provide information about their development of "local patriotism" or "nationalism" and international attitudes (for example, the perception of other nations, countries and international relations - see, for example, Jaspars et alii, 1965: 2).

5.9 The personnel responsible for the development and implementation of curricula in non-formal education in Kenya should undertake to explore ways in which the concept of TD may be used in their courses to facilitate the creation and promotion of feelings of national unity and international understanding amongst their course participants.

VIII.6 Conclusion

The distinctiveness of the research reported in this thesis may be attributed to the considerations outlined below.

VIII.6.1 The study represents the first attempt to replicate and extend cross-culturally Piagetian research on the DTD, using Stoltman's TDT, to an African context in general and to a Kenyan (East African) African sample in particular.

6.2 In contrast to some previous cross-cultural studies conducted in Africa, this research was undertaken by an indigenous East African citizen with functional knowledge of Kenya's ecological and cultural setting and with experience acquired mainly in East Africa and the United Kingdom as a student, school teacher, teacher educator, participant in curriculum development work and examiner in geography and geographical education.

6.3 The research subjects were African school pupils selected from different physico-eco-cultural environmental regions of Kenya.

6.4 The study made the first attempt to examine the relative influence of such factors as the grade, FD-FI dimension of cognitive style of psychological differentiation and operational logical class inclusion ability of the subjects in their DTD.

6.5 A final distinctive feature is the use of an inter-disciplinary approach by which the study has attempted to examine the development of one of the most important concepts, that of TD, which seem to constitute the theoretical framework of geographical teaching and learning. The development of this concept amongst Kenyan African children has been investigated in this research, for the first time, with particular reference to the curricula in school geography and geographical education in the Republic of Kenya.

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LIST OF ABBREVIATIONS USED IN THE BIBLIOGRAPHY

ASSP	African Social Studies Programme
Alb. J. Educ. Res.	Alberta Journal of Educational Research
Amer. J. Psychol.	American Journal of Psychology
Amer. Psychol.	The American Psychologist
AAAG	Annals of the Association of American Geographers
AAAPSS	Annals of the American Academy of Political and Social Science
ANY Acad. Sc.	Annals of the New York Academy of Sciences
Arch. de Psychol.	Archives de Psychologie
Austr. Dent. J.	Australian Dental Journal
Br. J. Educ. Psychol.	British Journal of Educational Psychology
Br. J. Psychol.	British Journal of Psychology
Br. Med. Bull.	British Medical Bulletin
Bull. Br. Psychol. Soc.	Bulletin of the British Psychological Society
BER	Bureau of Educational Research, Kenyatta University College, Nairobi.
Camb. J. Educ.	Cambridge Journal of Education
Canad. J. Beh. Sc.	Canadian Journal of Behavioural Science
Canad. J. Psychol.	Canadian Journal of Psychology
CBS	Central Bureau of Statistics, Nairobi.
Child Devt.	Child Development
CCE	Committee of Council on Education, London.
DES	Department of Education and Science, Great Britain.
Devtl. Psychol.	Developmental Psychology
E.A. Med. J.	East African Medical Journal
Educ. Psychol. Meas.	Educational and Psychological Measurement

Educ. Res.	Educational Research
Educ. Rev.	Educational Review
Encyc. Educ.	Encyclopaedia of Education
FAO	Food and Agricultural Organisation of the United Nations Organisation
G.E.	Geographic Education
Govt.	Government
Harv. Educ. Rev.	Harvard Educational Review
HMSO	Her Majesty's Stationery Office, London
Hum. Devt.	Human Development
IBRD	International Bank for Reconstruction and Development, World Bank, New York.
IDS	Institute of Development Studies, University of Nairobi, Nairobi.
Int. Ass. Cross-Cult. Psychol.	International Association of Cross-Cultural Psychology
IGU	International Geographical Union
Int. J. Psychol.	International Journal of Psychology
Int. Psychol. Rev.	International Psychology Review
Int. Rev. Appl. Psychol.	International Review of Applied Psychology
Int. Soc. Sc. Bull.	International Social Science Bulletin
Int. Soc. Sc. J.	International Social Science Journal
J. Abnorm. Soc. Psychol.	Journal of Abnormal Social Psychology
J. Child Psychol.	Journal of Child Psychology
J. Child Psychol. & Psychiat.	Journal of Child Psychology and Psychiatry
J. Cons. & Clin. Psychol.	Journal of Consulting and Clinical Psychology
J. Cross-Cult. Psychol.	Journal of Cross-Cultural Psychology
J. Educ. En. Af.	Journal of Education in Eastern Africa
J. Educ. Meas.	Journal of Educational Measurement

J. Educ. Res.	Journal of Educational Research
J. Exp. Educ.	Journal of Experimental Education
J. Exp. Psychol.	Journal of Experimental Psychology
JKF	Jomo Kenyatta Foundation, Nairobi.
J. Gen. Psychol.	Journal of Genetic Psychology
J. Geog.	Journal of Geography
J. Int. Psychol.	Journal International de Psychologie
J. Pers.	Journal of Personality
J. Pers. and Soc. Psychol.	Journal of Personality and Social Psychology
J. Psychol.	Journal of Psychology
J. Soc. Psychol.	Journal of Social Psychology
J. Soc. Res.	Journal of Social Research
J. Spec. Educ.	Journal of Special Education
K. Educ. Rev.	Kenya Educational Review
K. Educ. J.	Kenya Educational Journal
KIE	Kenya Institute of Education
K. Nat. Exams. Co.	Kenya National Examinations Council, Nairobi.
KUC	Kenyatta University College, Nairobi.
MHSS	Ministry of Housing and Social Services
MOE	Ministry of Education
NCEOP	National Committee on Education Objectives and Policies
NCGE	National Council for Geographic Education, USA.
NCSS	National Council for Social Studies, USA.
NFER	National Foundation for Educational Research in England and Wales
Occup. Psychol.	Occupational Psychology

Ped. Eur.	Pedagogica Europaea
Pers. and Mot. Skills	Perceptual and Motor Skills
Prof. Geog.	Professional Geographer
Psychol. Afr.	Psychological Africana
Psychol. Bull.	Psychological Bulletin
Psychol. Iss.	Psychological Issues
Psychol. Mon.	Psychological Monograph
Psychol. Rev.	Psychological Review
Psychom. Sc.	Psychomonic Science
ROK	Republic of Kenya
Rev. Educ. Res.	Review of Educational Research
Rhodes - Liv. J.	Rhodes-Livingstone Journal
RKP	Routledge and Kegan Paul, Publishers.
Scand. J. Psychol.	The Scandianavian Journal of Psychology
Schs. Co.	Schools Council of England and Wales
Soc. Beh. & Pers.	Social Behaviour and Personality
Scot. Educ. St.	Scottish Education Studies
Scot. Geog. Mag.	Scottish Geographical Magazine
Sec St. Cols.	Secretary of State for the Colonies, Great Britain.
Soc. Educ.	Social Education
SPSS	Statistical Package for the Social Sciences
S. Afr. J. Sc.	South African Journal of Science
TES	Times Educational Supplement, London.
TIBG	Transactions of the Institute of British Geographers
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UON	University of Nairobi
USA	United States of America

USDHEW	U.S. Department of Health, Education and Welfare, Washington, D.C.20202.
WCOTP	World Confederation of Organisations of the Teaching Profession
WHO Bull.	World Health Organisation Bulletin

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In addition to the references which were specifically cited in the text, this bibliography also contains several other pertinent literary works which were found to be generally useful in the preparation of this thesis. For ease of identification, whilst each of the uncited general references is preceded by an asterisk (*), all the official governments' and other organisations' publications, reports and/or papers are preceded by the plus (+) sign. Thus, each of the uncited government publications is preceded by the two signs (+*).

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APPENDICES

APPENDIX II.1

KENYA'S OBJECTIVES OF PRIMARY EDUCATION*

1. To provide for the child in the early years of schooling a balanced and co-ordinated education experience made up of the development of communication skills, the acquisition of literacy, numeracy and manual dexterity, sense-training, individual training in self-expression and self-control, and social training.

2. To help the child to develop awareness and understanding of his environment.

3. To help the child to develop habits of learning with enjoyment leading to the experience of success.

4. To help the child to grow into a strong and healthy person.

5. To help the child to form a good character and understand his responsibilities as a member of his community, and to develop a constructive attitude to life based on moral and religious values.

6. To provide for the child, especially in upper primary classes, a course of study which will be a suitable foundation for either secondary schooling or other further educational experience.

7. To help the child to appreciate his cultural background and that of others, to develop his aesthetic sense, and to make good use of his free time.

* Source: Kenya Ministry of Education (1975): Kenya Syllabus for Primary Schools: The New Primary School Geography Syllabus, reprinted 1978, Jomo Kenyatta Foundation, Nairobi, Page X.

APPENDIX II.2

KENYA'S AIMS FOR THE NEW PRIMARY GEOGRAPHY SYLLABUS*

INTRODUCTION

This is the revised version of the 1967 Geography Syllabus and it should be noted that some geography activities are started right from Standard I. This has necessitated the concept of integration for Standards I and II that various disciplines are drawn together, where this is practical to do so. Therefore, the section on Standards I and II has been left out to form the Lower Primary Course.

THE AIMS

1. By a systematic study of the local area to build up an understanding of man's relation to his environment.

2. To create visual impressions of life and conditions outside the immediate environment.

3. To develop an understanding of maps through practical field work and constant practice in map reading and interpretation.

4. To develop an understanding of the interdependence of the peoples of the world.

5. To develop an understanding of the developments taking place in Kenya and Africa.

6. To develop the skills necessary for the study of geography and an understanding of basic geographical concepts.

*Source: Kenya Ministry of Education (1975): Kenya Syllabus for Primary Schools: The New Primary Geography Syllabus, reprinted 1978, Jomo Kenyatta Foundation, Nairobi, page 1.

APPENDIX II.3

KENYA'S OBJECTIVES OF PRIMARY HISTORY TEACHING*

1. To study the people and events of the past which are important for an understanding of the way in which people live and behave today.

2. To provide pupils with an historical background against which they may learn of their country in modern times and thereby develop a healthy national pride in Kenya's heritage.

3. To help in the development of pupils as intelligent citizens who may enter the adult world possessing some understanding of the way in which the government of their country functions.

4. To learn about the people as members of living communities and thus to avoid the study of history as a set of inert ideas.

5. To help pupils to develop a sense of time.

6. To give pupils the opportunity to develop and practise simple skills involved in the presentation of historical information.

7. To achieve, as a result of the use of imaginitive techniques, an interest in history and an enjoyment in studying it.

*Source: Kenya Ministry of Education (1973): Kenya Syllabus for Primary Schools: History Syllabus, reprinted 1979, Jomo Kenyatta Foundation, Nairobi, page 1.

APPENDIX II.4.1

KENYA'S NATIONAL GOALS OF EDUCATION*

1. National Unity

Education in Kenya must foster a sense of nationhood and promote national unity. Kenya's people belong to different tribes, races and religions, but these differences need not divide them. They must be able to live and interact as Kenyans. It is a paramount duty of education to help the youth acquire this sense of nationhood by removing conflicts and by promoting positive attitudes of mutual respect which will enable people of different tribes, races and religions to live together in harmony and to make a positive contribution to the national life.

2. National Development

Education should meet the economic and social needs of national development, equipping the youth of the country to play an effective and productive role in the life of the nation.

Economic Needs

The system of education in Kenya should produce citizens with the skills, knowledge, expertise and personal qualities she requires to support her growing economy. She is building up a modern and independent economy which is in need of adequate domestic manpower to support it. She requires both self-employed manpower and manpower in paid employment.

Social Needs

Education in Kenya must prepare children for those changes in attitudes and relationships which are necessary for the smooth progress of a rapidly developing modern economy. There is bound to be a silent social revolution following in the wake of rapid modernization. Education should assist our youth to adapt to this change.

However, adaptability to change cannot be interpreted to mean a passive indiscriminating acceptance of all change. What is meant is the development in the country's youth of an enquiring attitude towards traditionally established values. The children should be able to blend

the best of the traditional values with the changed requirements that must follow rapid development in order that they may build a stable and modern Kenyan Society.

3. Individual Development and Self-Fulfilment

Education should provide opportunities for the fullest development of individual talents and personality. It should help every child to develop his potential interests and abilities. A vital aspect of individual development is character building. Education should foster sound moral and religious values in order to help children to grow up into self-disciplined, self-reliant and integrated citizens.

4. Social Equality and Collective Social Responsibility

Education should promote social equality and foster a sense of social responsibility within an educational system which provides equal educational opportunities for all. It should give the children varied and challenging opportunities for collective activities and corporate social service.

5. Respect and Development of Cultural Heritage

Education should respect, foster and develop Kenya's rich and varied cultures. It should instil in the youth of Kenya an understanding of past and present culture and its valid place in contemporary society. It should also instil in the youth a sense of respect for unfamiliar cultures.

6. International Consciousness

Education should foster positive attitudes to other countries and to the international community. Kenya is part of the international community. Her people do not live in a vacuum. They are part of the complicated and interdependent net-work of peoples and nations. Education should therefore lead the youth to accept membership in this international community with all the obligations and responsibilities, rights and benefits that this membership entails.

APPENDIX II.4.3

The Goals in Short

To sum up - Kenya has one fundamental goal for her education. That goal is to prepare and equip the youth to be happy and useful members of Kenyan Society. To be happy they must learn and accept the national values, and to be useful they must actively work towards the maintenance and development of this society.

*Source: Kenya Ministry of Education (1975): Kenya Syllabus for Primary Schools: The New Primary Geography Syllabus, reprinted in 1978, Jomo Kenyatta Foundation, Nairobi, pages vii-ix.

APPENDIX II.5.A-I

COPIES OF SOME LETTERS OF CORRESPONDENCE AND OF OFFICIAL AUTHORITY TO UNDERTAKE THE RESEARCH

APPENDIX II.5.A

UNIVERSITY OF BRISTOL

SCHOOL OF EDUCATION

DIVISION OF ADVANCED STUDIES

PROFESSOR OF EDUCATION: W. P. ROBINSON, M.A., D.Phil.

HELEN WODEHOUSE BUILDING
35 BERKELEY SQUARE
BRISTOL
BS8 1JA

TELEPHONE BRISTOL 24161

11th September, 1979.

Mr. J. Lwanga-Lukwago,
[redacted]

Dear James,

Thank you very much for your interesting letter: congratulations on your success! I apologise for the delay in my reply.

You are, of course, very free to use the two tests of spatial ability I devised. They were produced for a particular purpose at that time rather than as generalisable tests for use on various occasions. The test of level of space concept was designed to see whether children had developed the operations required for a reorientation of viewpoint, separately and as an overall structure (in Piaget's use of that term). This, as you know, required the children to restructure a scene before them as if from a higher vantage point, looking back towards their actual point of view. The instructions were designed to reduce the dependency of performance and marking on drawing skill as such. Labelling the features alone was sufficient to examine the availability of the "left-right" reorientation and of the "nearer-further" operation even if the drawings were, in other respects, poor. One had to mark the drawings for the vertical dimension, of course, (more of a plan view from altitude than from the actual point of view at ground level). I don't see why this test couldn't be reproduced using pictures but I would suggest two scenes to increase reliability. The "one scene" version was reasonably reliable (r_{tt} = 0.87) and claims for its external validity rest on a demonstrated correlation of .481 with an established test of the k-factor.

The effectiveness of judgment test was a modification of Piaget's using a doll's house and a number of view points. Its reliability was high (r_{tt} = 0.95) and its correlation with the space factor was .586 which, again, supports arguments for its validity as a test having spatial demands though leaving substantial variance unaccounted for. A full factorial study of these tests' content has not been carried out.

I hope these points are of some help. If you would like more information, drop me another line or come across to Bristol.

Best wishes,

Yours sincerely,
[redacted]

Dr. D. Satterly.

APPENDIX II.5.B

WESTERN MICHIGAN UNIVERSITY

DEPARTMENT OF GEOGRAPHY—WOOD HALL

KALAMAZOO, MICHIGAN
49008

May 18, 1979

Mr. Lwanga-Lukwago
[redacted]

Dear Mr. Lwanga-Lukwago:

I'm very happy to learn that you are planning a research study in Africa. I shall get to your questions directly.

1. You may have permission to use the original test, a copy of which is enclosed.

2. Copies of the item analysis, reliability and validity statements are enclosed.

I'm very rushed at this time with several research studies, but will attempt to reflect on your dissertation topic in the near future. After having visited Nigeria in 1978 I am convinced you will reveal some very interesting decentration patterns.

[redacted]

Joseph P. Stoltman
Chairperson
[redacted]
pmn

Enclosures

EDUCATIONAL TESTING SERVICE PRINCETON, N.J. 08541

609-921-9000
CABLE-EDUCTESTSVC

PSYCHOLOGICAL DEVELOPMENT
RESEARCH DIVISION

August 9, 1979

Mr. James Lwanga-Lukwago
[redacted]

Dear Mr. Lwanga-Lukwago:

Your letter to Dr. Donald Goodenough has been referred to me for reply. Under separate cover I am sending you materials that you asked for and, in some cases, additional material that may be relevant. However, we are unable to send you everything you requested.

No. 1. Witkin, H. A. (1978) Cognitive Styles in Personal and Cultural Adaptation. Heinz Werner Lecture Series, 1977, Clark University Press, Worcester, Massachussets, U.S.A. Note: This is a book and can be purchased from Clark University Press. The cost is approximately $6.00. Or you may order it through a local book store. Or you may locate it in a library.

No. 4. Omari, I. M. (1975) Note: Legal restrictions prevent us from photocopying journal articles other than written by Dr. Goodenough. You may locate this in a library or contact Omari directly.

You will notice that No. 2 is not included. Instead I have sent a published version(which is No. 5 on your list). It is a more up to date version of No. 2 which is no longer available.

Sincerely,

[redacted]

Bernice Gall
Administrative Assistant

APPENDIX II.5.D.

Telegraphic address: "Rais"
Telephone: Nairobi 27411
When replying please quote
Ref. No. .OP.13/001/9C257/7
and date

OFFICE OF THE PRESIDENT
P.O. Box 30510
NAIROBI, KENYA

8th February, 19.80

Mr. James Lwanga-Lukwago,
Kenyatta University College,
P.O. Box 43844,
NAIROBI.

Dear Sir,

PROBATIONAL RESEARCH CLEARANCE

You are hereby permitted to start your research entitled, "A Study of Concept Development and Comprehensive of Geography by Secondary School Pupil in the Republic of Kenya."

This permit is valid for one month only after which you should check with this office for the actual permit.

Yours faithfully,

[redacted]

E.K. RUCHIAMI
for: PERMANENT SECRETARY/CABINET AFFAIRS

C.C.
The Secretary,
National Council for Science & Technology,
P.O. Box 30623,
NAIROBI.

APPENDIX II.5.E

COPY OF THE RESEARCH PERMIT ISSUED TO THE AUTHOR BY THE OFFICE OF THE PRESIDENT, NAIROBI, KENYA

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

Research Permit No. OP.13/001/9C287/10

Date of issue .....15th MARCH, 1980.....

Fee received .....100/=.....

[redacted]

E.K. RUCHIAMI

for: *Permanent Secretary, Office of the President*

Signature

PAGE 2

THIS IS TO CERTIFY THAT:—

~~MXXXX~~/Mr. ~~XXXXXXX~~ JAMES LWANGA-LUKWAGO

of (Address) KENYATTA UNIVERSITY COLLEGE

has been permitted to conduct research in ..... Location,

NAIROBI, KIAMBU & NAROK District,

..... Province,

on the topic THE DEVELOPMENT OF TERRITORIAL DECENTRATION IN CHILDREN: A STUDY OF PIAGETS SPATIAL STAGES IN RELATION TO THE SCHOOL GEOGRAPHY CURRICULUM IN KENYA

for a period ending 30TH JUNE, 19 80

PAGE 3

NOTES

1. Government Officers will not be interviewed without prior appointment.
2. No questionnaire will be used unless it has been approved.
3. You must report to the District Commissioner of the area before embarking on your research.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

GPK 1869—2m—10/78

APPENDIX II.5.F.

TESTIMONIAL FROM THE DIRECTOR, BER, KUC.



BUREAU OF EDUCATIONAL RESEARCH
KENYATTA UNIVERSITY COLLEGE

File:
Telegrams: KENUCO NAIROBI
Telephone: Nairobi, Kahawa 356/7 Ext. 399

P.O. Box 43844
NAIROBI
KENYA

12th February, 1980.

TO WHOM IT MAY CONCERN

This is to introduce Mr. James Lwanga-Lukwago who is a Research Associate in the Bureau of Educational Research here.

Mr. Lukwago is conducting Research on "THE DEVELOPMENT OF TERRITORIAL DECENTRATION IN CHILDREN: A STUDY OF PIAGET'S SPATIAL STAGES IN RELATION TO THE SCHOOL GEOGRAPHY CURRICULUM IN THE REPUBLIC OF KENYA." He is an experienced researcher, who has worked in a similar area before. I shall be most grateful if you could kindly assist him in his work, and give him every possible support in all practical matters you deem appropriate.

Yours sincerely,

[redacted]

Dr. G.S. Eshiwani.
Ag. Director.

APPENDIX II.5.G

CITY COUNCIL OF NAIROBI

EDUCATION DEPARTMENT

Telegrams: "SCHOOLING"
Telephone: 28318 OR 31231
2nd FLOOR COUNTY HALL
When replying please quote
Ref. No. GL/NC/141/Vol.I/6
and date

COUNTY HALL
P. O. Box 30298,
NAIROBI

25th March, 1980

The Headteachers,

Kawangware Primary School,
Moi Avenue Primary School,
St. Michael's Primary School,

Dear Sirs,

Permission is given for **Mr. James Lwanga-Lukwago** to visit your school in connection with a research that he is doing on the Development of Territorial Decentration in Children.

Please give him all the necessary assistance.

Yours faithfully,

[redacted]

A.S. Maina
CITY EDUCATION OFFICER, NAIROBI

APPENDIX II.5.H

MINISTRY OF EDUCATION

Telephone: Kiambu 2021

When replying please quote
SEC/SCH/24/70.
Ref. No. .....
and date

DISTRICT EDUCATION OFFICE
P.O. Box 9
KIAMBU
26th March, 19 80

The Headmasters:

Kiambu ~~High~~ School,

Kabuku Primary School,

New Ngecha Primary School.

Ngenia Secondary School.

RE: MR. JAMES LWANGA - LUKWAGO.

KENYATTA UNIVERSITY COLLEGE

Permission is given for the above cited to visit your school in connection with a research that he is doing on the development of Territorial Decentration in children.

Please give him all the necessary assistance.

[redacted]

ESNK/cwm

(E.S.N. Kibutha)
for DISTRICT EDUCATION OFFICER
KIAMBU

APPENDIX II.5.I

MINISTRY OF EDUCATION

Telegrams: "INDUSTRY", Narok
Telephone: Narok 31
When replying please quote

DISTRICT EDUCATION OFFICE
P.O. Box 18
NAROK

Ref. No. N/143/A/57
and date

31st March, 1980

The Headmaster Narok Secondary School,
P.O. Box 45,
NAROK.

The Headmaster, Ilmashariani Pri. School,
P.O. Box 18,
NAROK.

RE: PERMISSION TO CONDUCT RESEARCH.

In reference to the research permit No. OP.13/001/9c 287/10 dated 15/3/80, from the Office of the President, Mr. James Lwanga Lukwago of Kenyatta University, has the permission to visit your school for the purpose of conducting research on the topic stated below:-

THE DEVELOPMENT OF TERRITORIAL DECENTRATION IN CHILDREN.

This is to be done during the research period ending 30th June 1980.

Please do give him all the necessary assistance.

[redacted]

for D.R. Kiziili
DISTRICT EDUCATION OFFICER,
NAROK.

c.c.

Permanent Secretary,
Office of the President

Att. Mr. E.K. Ruchiami.

APPENDIX II.5.J: CIRCULAR LETTER TO ALL HEADTEACHERS OF THE PARTICIPANT SCHOOLS

BUREAU OF EDUCATIONAL RESEARCH
KENYATTA UNIVERSITY COLLEGE

File:
Telegrams: KENUCO NAIROBI
Telephone: Nairobi, Kahawa 356/7 Ext. 399

P.O. Box 43844
NAIROBI
KENYA

.....

.....

.....

.....

Dear Sir/Madam,

RE: 'THE DEVELOPMENT OF TERRITORIAL DECENTRATION IN CHILDREN: A STUDY OF PIAGET'S SPATIAL STAGES IN RELATION TO THE SCHOOL GEOGRAPHY CURRICULUM IN THE REPUBLIC OF KENYA'

The above-named study is being carried out in the Districts of Nairobi, Kiambu, and Narok in the Nairobi, Central, and Rift Valley Provinces of Kenya, respectively. It is designed, amongst other reasons, to contribute towards an improved understanding of the problems associated with some aspects of the planning, operation, evaluation, and renewal of the curriculum in school Geography and Geographical Education in Kenya.

The research, which is being carried out under the auspices of the Bureau of Educational Research, Kenyatta University College, and the University of Southampton, U.K., has received the blessing and permission of the Office of the President and other relevant authorities. Thus, a Research Permit No. op.13/001/9C287/10, dated 15/3/80, has been issued to the undersigned Research Associate, who, on arrival at your school, will show you the same documents for identification and general information purposes.

Your school is one of the many that have been scientifically - selected to participate in the above-named study. Your cooperation and assistance, together with that of your staff and pupils, in making this undertaking a success will be greatly appreciated.

To speed up the processes of selecting the pupils to be interviewed and of interviewing them, I would kindly request you to make available to me copies of the following pieces of information for all the streams in the Standard/Forms of your primary/secondary school as shown below:-

1. For Standard 6 - a. Achievement Scores and Average Grades for Standard 5;
   b. Class Performance Grades and the Class Average for Term I of Standard 6, 1980; and
   c. Any general background information for all the pupils - e.g. name(s), age, birthplace, place of residence, parents' name(s) father's/guardian's occupation, etc.

...../2

2. For Form I - a. The pupils' CPE results for 1979;
   b. Class Performance Grades and the Class Average for Term I of Form I, 1980;
   c. As for Standard 6 in 1.c. above; and
   d. Names of primary school attended, district and province in which the school is located.

3. For Form III
   a. Class Performance or Achievement Scores and Average Grades for Term III of Form II, 1979;
   b. Class Performance Grades and Average Grades for Term I of Form III, 1980;
   c. As for Standard 6 in 1.c. above; and
   d. As for Form I in 2.d. above.

This information will be collected during my first visit to your school. I am also confident that you will kindly give me any further general information about your school, and I will also brief you on the nature of interviews to be held with the students when we meet.

All the information obtained from your office and as a result of the interviews held with the selected students will be used only for the purpose(s) stated above, and will be kept confidential.

Looking forward to meeting you, and thanking you in advance for your co-operation and assistance in this undertaking, I remain.

Yours sincerely,

[redacted]

Lwanga-Lukwago, James
Research Associate.

JL-L/cwm.

APPENDIX II.6.1

THE CLASSIFICATION OF THE SOCIO-ECONOMIC STATUS OF THE PARENTS' (SESP) OCCUPATIONS: CATEGORIES AND SOME EXAMPLES OF THE MAIN OCCUPATIONS[1, 2]

A. MALE OR FATHER'S OCCUPATIONS:

1. Higher Non-Manual: Higher Professional, Managerial and Technical - (Non-Manual I):

   Government Minister; Parliamentarian; Judge; Head of government department (Permanent Secretary, Under Secretary, etc.); University Vice-Chancellor and Principal of College of Higher Education; Higher Clergy (Archbishop, Chief Khadhi, Bishop, etc.); Heads of Government Security Services (Armed Forces, Police, Prisons, etc.); University Professor; Higher Medical and Veterinary Practitioners (doctors, dental and Veterinary Surgeons, etc.); State Attorneys and Advocates; Managing Director/Proprietor of a large enterprise; Chartered Accountant, Surveyor, Architect and Engineer; Provincial Civil and Security Services Administrators; etc.

2. Intermediate Non-Manual: Mostly Intermediate Professional and Managerial (Non-Manual II):

   Director/Manager/Owner of a medium-sized enterprise; Assistant Manager of a large business firm or parastatal corporation (e.g. Kenatco, E.A. Power and Lighting Co., Kenya Oil Pipeline Co., etc.); Building Contractor; Certified Engineer, Accountant and Auditor; University Lecturer; Principal of non-graduate college; Clergy or equivalent religious leader; Insurance Underwriter; Leader of a large recognised Trade Union (e.g. Kenya National Union of Teachers (KNUT), Transport and General Workers' Union, etc.); Commercial Air Pilot; Film Star; Pharmacist; District Government Civil and Security Services Officers or Administrators; and Professional Author, etc.

3. Lower and Routine Non-Manual: Mainly Lower Professional, Technical, Clerical and Ancillary (Non-Manual III):

   Actor; Artist, Secondary School Graduate Teacher; Proprietor/ Manager of a small business firm; Medium-scale Progressive Farmer; Florist; Laboratory/Factory/Audio-Visual Technicians; Stenographic Secretary; Draughtsman; Salesman; Shop-owner; Non-ordained Clergy and other religious workers; Game Warden; Forest Officer; Lower Ranks of Officers in Government Civil and Security Services (e.g. Policemen, NCOs in Armed Forces, Prison Wardens, etc.); Bar-Tender; Intern-teacher Supervisor; Book-keeper; and Clerk/typist or Lower Executive Officer with some formal secondary education, etc.

4. Skilled Manual and Other Lower Professionals:

   Non-graduate teachers (S_1, P_1, P_2 and P_3); Baker; Fireman; Book-binder; Professional Sportsman; Motor-mechanic; Car/Motor-cycle Racer; Carpenter; Mason/Craftsman; Tailor; Tractor Operator; Welder; Game/Forest Ranger; Wholesale/Retail-shop Assistant; Crane Driver; Cooper; Electrician; and Office Clerk with formal primary education, etc.

5. Semi-Skilled Manual:

   Skilled manual apprentice/trainee; Bus/train driver/conductor; Factory Worker; Fisherman; Machine Operator; Sailor; Taxi/ Matatu Driver; Professional Security Guards (e.g. Securicor Guards, etc.); Stock-holder farmer with over five years of formal education; and blacksmith with at least five years of formal education, etc.

6. Unskilled Manual:

   Farm labourer; Gardener (Shambaman); Handcart-(Mkokoteni)-driver; Casual worker; Child-minder (Ayah); Non-professional Watchman; Higgler or Hawker; Domestic cook; Herdsman; Open Kiosk (Market-Stall Seller; and Stock owner/Farmer without any formal education, etc.

B. FEMALE OR MOTHERS' OCCUPATIONS:

1. Higher Non-Manual: Higher Professional, Managerial and Technical (Non-Manual I):

   All as outlined in A:1 above.

2. Intermediate Non-Manual: Mostly Intermediate Professional and Managerial (Non-Manual II):

   Certified Accountant and Quantity Surveyor, etc.; Higher Executive in Family Business; Head of College/High School; Lecturer; Manageress/Proprietress of Medium-sized enterprise; Pharmacist; Authoress; Hospital Matron/Nursing Sister; etc.

3a. Upper Segment of Lower Non-Manual: Mainly Lower Professional and Managerial (Non-Manual III-A):

   Auditor; Book-Keeper; Dispenser; Staff Nurse, or Midwife; Factory Supervisor; Interior/Fashion Designer; Laboratory/Audio-Visual Technician; Operator or Owner of a Small Business; Saleswoman; Steno-Secretary; Secondary School graduate teacher; Actress; Artist; Policewoman; Film Star; Institutional Cateress; etc.

3b. Lower Segment of Lower Non-Manual-Mainly Clerical, Ancillary and Routine (Non-Manual III-B):

   Non-graduate teacher; Clerk/Typist; Shop Assistant; Trainee Nursing Officer; Waitress; Accounts Clerk; etc.

4. Skilled Manual:

   Book-binder; Dress-maker; Hair-dresser; etc.

5. Semi-Skilled Manual:

   Apprentice/trainee; Bus/train Conductress; Factory-line worker; Machine Operator; Taxi/Matatu Driver; etc.

6. Unskilled Manual:

   Cook; Casual Worker; Higgler or Hawker; etc.

Notes:

1. As adopted and modified from Figueroa's (1976) Model in: Figueroa, P.M.E. and Persaud, G. (Eds.) (1976): Sociology of Education - A Caribbean Reader, Oxford University Press, U.K., pages 160-162.

2. The final compilation of the occupational classification presented in this Appendix was preceded by some comprehensive discussion of the various alternative lists of occupations drawn up by the present writer and a number of graduate students who were completing their M.Ed. degree studies at Kenyatta University College during the 1980/81 academic year. These discussions fulfilled two main purposes. Firstly, they helped to ensure that the table of SESP produced finally is representative of most of the common occupations in which the majority of the working population in Kenya are engaged. Secondly, through some careful scrutiny of all the occupations contained in Figueroa's (1976) Model, it was possible to produce lists of occupations which are relevant to Kenya's local context. The writer is grateful to these graduate students for their assistance.

APPENDIX IV.1*

A TABULATED DETAILED OUTLINE OF THE DISTRIBUTION AND PERCENTAGE OF SUBJECTS IN THE RESEARCH SAMPLE BY REGION, GRADE, SEX AND AGE (1980) (N = 270)

REGIONS+	REGION 3								REGION 2								REGION 1												OVERALL TOTAL[c]	
Grade	VI		1		3		N[a]		VI		1		3		n		VI		1		3		n		n[b]		%[b]		N	100%
Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Age Range																														
11 and below	-	1	-	-	-	-	-	1	1	-	-	-	-	-	1	-	11	7	-	-	-	-	11	7	12	8	4.44	2.96	20	7.41
12 years	-	4	-	-	-	-	0	4	3	6	-	-	-	-	3	6	4	8	-	4	-	-	4	12	7	22	2.59	8.15	29	10.74
13 years	2	4	1	1	-	-	3	5	3	3	2	4	-	-	5	7	-	-	3	10	-	-	3	10	11	22	4.07	8.15	33	12.22
14 years	7	1	6	3	-	-	13	4	8	6	4	4	-	-	12	10	-	-	12	1	-	-	12	1	37	15	13.70	5.56	52	19.26
15 years	1	5	-	5	-	-	1	10	-	-	5	7	-	1	5	8	-	-	-	-	5	2	5	2	11	20	4.07	7.41	31	11.48
16 years	3	-	6	5	2	2	11	7	-	-	2	-	3	6	5	6	-	-	-	-	10	13	10	13	26	26	9.63	9.63	52	19.26
17 years	1	-	1	1	6	11	8	12	-	-	2	-	7	4	9	4	-	-	-	-	-	-	-	-	17	16	6.30	5.92	33	12.22
18 years	1	-	-	-	3	1	4	1	-	-	-	-	4	4	4	4	-	-	-	-	-	-	-	-	8	5	2.96	1.85	13	4.81
19 years	-	-	1	-	2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1.11	-	3	1.11
20 years	-	-	-	-	2	1	2	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	3	1	1.11	0.37	4	1.48
Total	15	15	15	15	15	15	45	45	15	15	15	15	15	15	45	45	15	15	15	15	15	15	45	45	135	135	49.98	50.0	270	(100.00) 99.99

Source: Author.

Notes: a = Grade running sub-total number of subjects (male and female) in each region per age group.
b = Grade and regional sub-total and percentage of male and female subjects per age group.
c = Overall grade and regional total number and percentage of all subjects per age group.

* See also Table IV.2, page 233, which is the tabulated summary outline of the data presented in this Appendix.

\+ The Research Regions are: Nairobi (1), Kiambu (2) and Narok (3).

APPENDIX V.1

TERRITORIAL DECENTRATION TEST

INFORMATION SHEET

CONFIDENTIAL

1. Code No. _____ 2. Name _____ 3. Sex _____ (Female/Male)

4. Date of Birth — Date _____ Month _____ Year _____

5. Age _____

6. Date of Test _____ _____ _____

7. School _____ 8. Std./Form _____

9. Location _____ 10. Division _____

11. District _____ 12. Province _____

13. Country or Nation _____

14. Father's Occupation _____ 15. Father's Education Level _____

16. STANDARDISATION TEST INFORMATION:

Test	Score	Date

17. TESTING CONDITIONS (Tick one)

Very Good ____ Good ____ Suitable ____ Poor ____ Very Poor ____

18. STUDENT'S RESPONSES (Tick one)

Sentences ____ Phrases ____ Single Words ____ Non-Verbal ____

19. Does the student live in a city/town or in a rural area? _____ (city/town/rural area)

20. How long has the student lived at the present location? _____ Years _____ Months

21. What is the student's travel experience (Tick one)

None ____ Very Limited ____ Limited ____ Reasonable ____ Wide ____ Very Wide ____ Excellent ____

22. Remarks

Score	Bv	Expl.	Total
Subtest A			
Subtest B			
Subtest C			
Subtest D			
Total			

23. Interviewer: _____

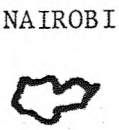
Bv = Behavioural
Expl. = Explanation

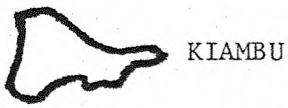
APPENDIX V.2.A

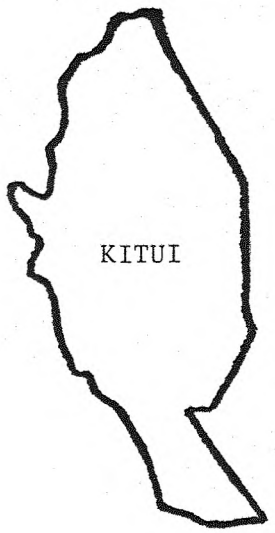
DISTRICT OUTLINE MAPS

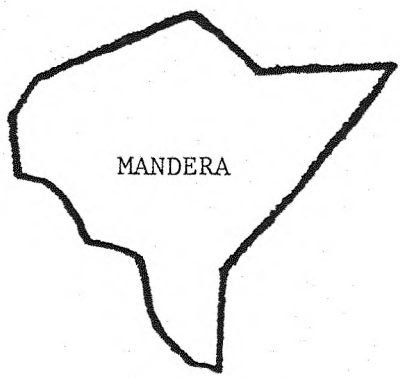
(ALL ON THE SAME SCALE)

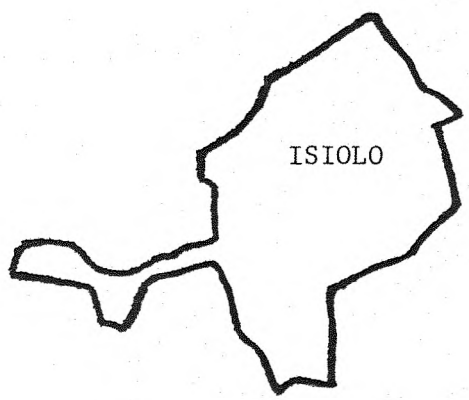








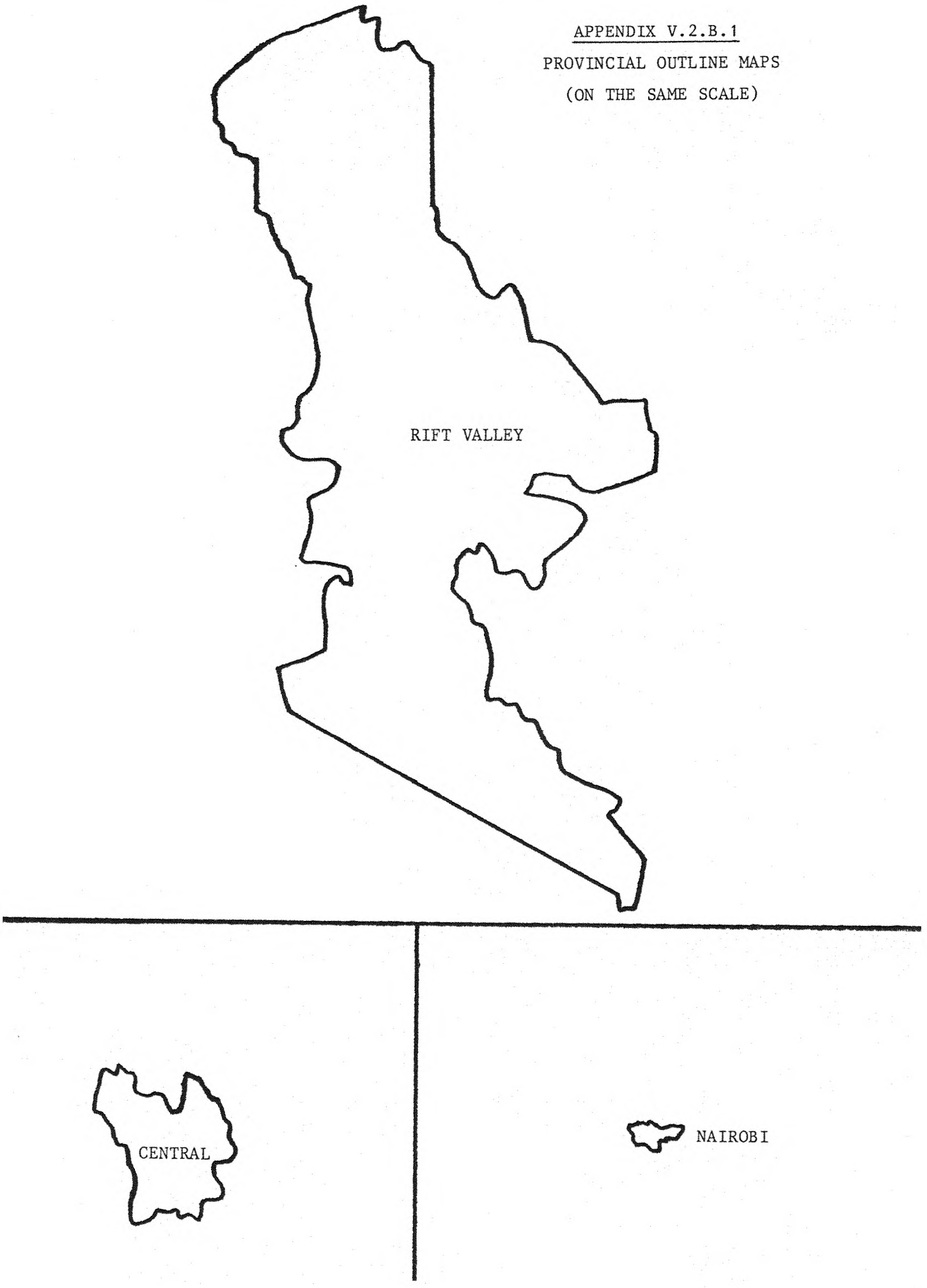




APPENDIX V.2.B.1

PROVINCIAL OUTLINE MAPS

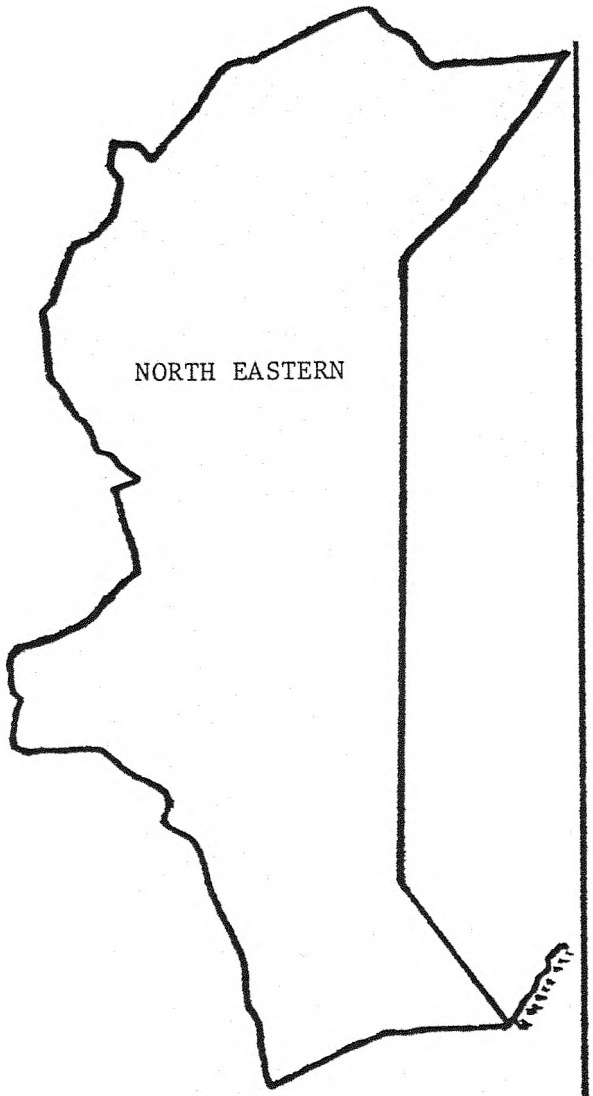
(ON THE SAME SCALE)

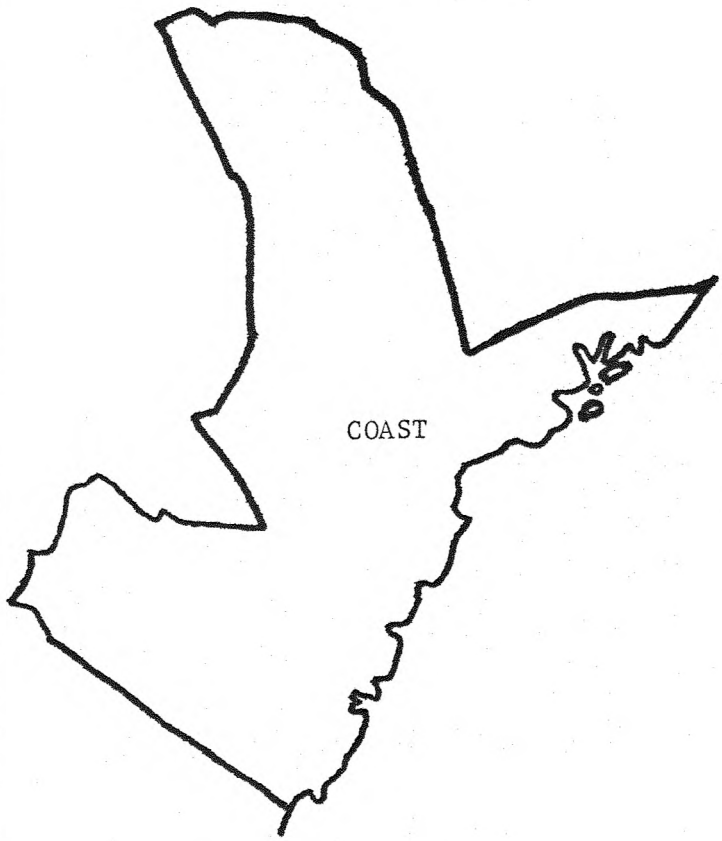


APPENDIX V.2.B.2

PROVINCIAL OUTLINE MAPS

(ON THE SAME SCALE)





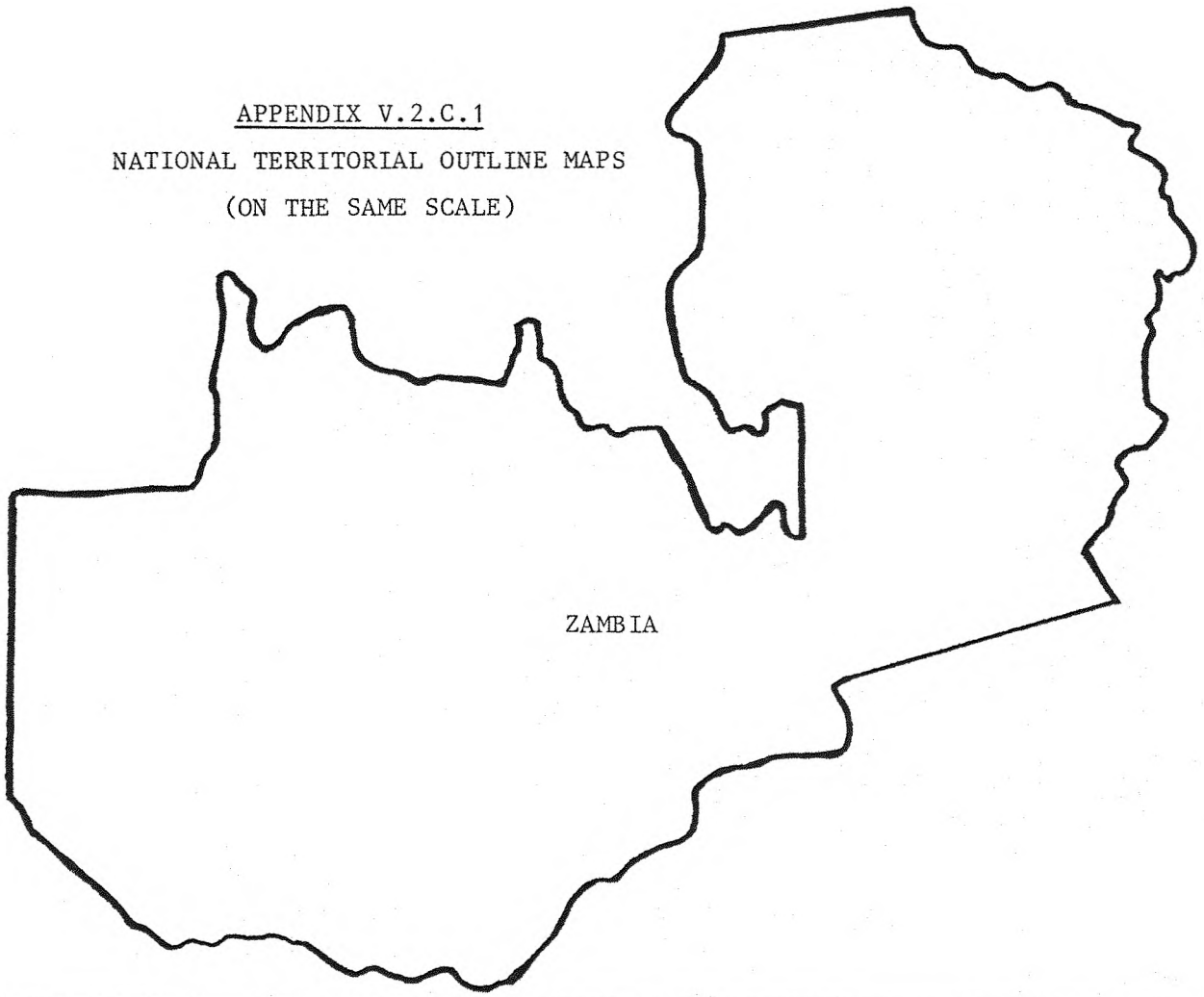


WESTERN

APPENDIX V.2.C.1

NATIONAL TERRITORIAL OUTLINE MAPS

(ON THE SAME SCALE)

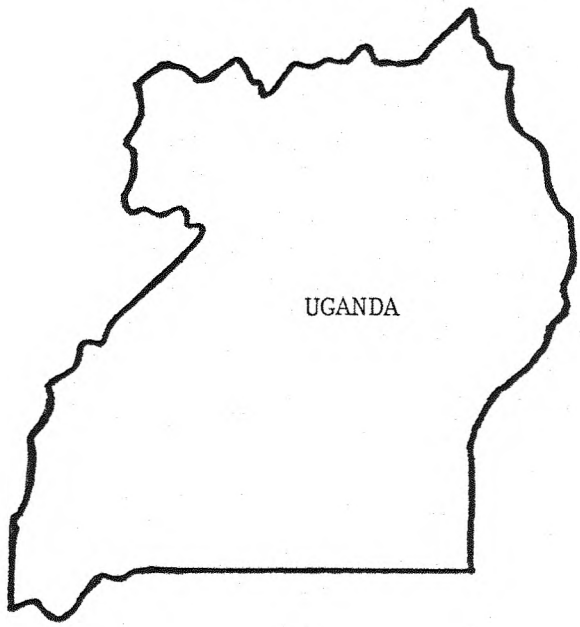


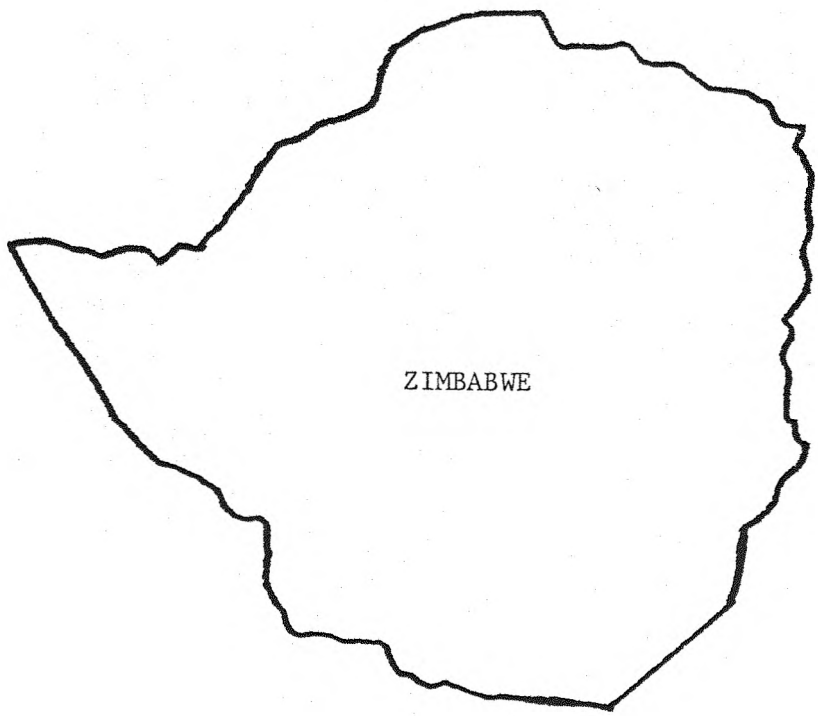


APPENDIX V.2.C.2

NATIONAL TERRITORIAL OUTLINE MAPS

(ON THE SAME SCALE)





APPENDIX V.3.A-D

TERRITORIAL DECENTRATION TEST: DIRECTIONS FORM
(After Stoltman October 1971)

APPENDIX V.3.A: SUB-TEST A: VERBAL TERRITORIAL IDENTIFICATION

Item	Directions	Verbal Instructions
1 1.1	Verbal question.	What is the name of the city/town you live in? near? What is the name of the city/town where your family buys food?
2 2.1	Verbal question.	Do you live in a district?
3 2.1	Verbal question. Record response to why.	What is the name of the district? Why do you think you live in a district? (See Manual - pp.6-7).
4 2.1	Verbal question. Show child district outline maps 4a, 4b, 4c, 4d. Record response to the why.	Which map shows the district you live in? How do you know it is the correct map?
5 3.1	Verbal question.	Do you live in a province?
6 3.1	Verbal question. Record response to why.	What is the name of the province? Why do you think you live in a province? (See Manual - pp.6-7).
7 3.1	Verbal question. Show child province outline maps 7a, 7b, 7c, 7d. Record response to the why.	Which map shows the province where you live? How do you know it is the correct map?
8 4.1	Verbal question.	Do you live in a nation or country?
9 4.1	Verbal question. Record response to why.	What is the name of the nation or country? Why do you think you live in a nation or country? (See Manual - p.7).
10 4.1	Verbal question. Show child nation or country outline maps 10a, 10b, 10c, 10d. Record response to the why.	Which map shows the nation or country where you live? How do you know it is the correct map?

APPENDIX V.3.B: SUB-TEST B: VERBAL TERRITORIAL RELATIONSHIP

Item	Directions	Verbal Instructions
1 1.2	Verbal question.	~~Where is (name local city/town)?~~ Have you heard of (local city/town)?
2. 1.2	Verbal question.	~~Where else is (name local city/town)?~~
3 2.2	Verbal question.	Where is (name local district)? Have you heard of (local district)?
4 2.2	Verbal question	Where else is (name local district)?
5 3.2	Verbal question.	Where is (name home province)? Have you heard of (home province)?
6 3.2	Verbal question.	Where else is (name home province)?
7 3.2	Verbal question.	Name something that is part of our province.
8 4.2	Verbal question	Where is (name nation or country)? Have you heard of (name nation or country)?
9 4.2	Verbal question.	Name something that is part of (name nation or country

APPENDIX V.3.A-D.2

TERRITORIAL DECENTRATION TEST: DIRECTIONS FORM (CONTD.)

APPENDIX V.3.C: SUB-TEST C: TERRITORIAL INCLUSION USING WRITTEN SYMBOLS

Item	
1 Show child the circle printed on page 1 of the response booklet. 1.3 Record response to the why. Be certain that the child understands that the circle may be any size and any place on the page.	1. Look at this circle. It shows (name local district). Please, draw a circle on this page which shows (name local city/town). Why did you put the circle showing (name local city/town) there?
2 Show child the circle on page 2. 1.3 Record response to the why.	Look at this circle. It shows (name local province). Please, draw a circle which correctly shows (name local city/town). Why did you put the circle showing (name local city/town) there?
3 Show child the circle on page 3. 2.3 Record response to the why.	Look at this circle. It shows (name local province). You draw a circle which correctly shows (name local district) Why did you put the circle showing (name local district) there?
4. Show child the circle on page 4. 2.3 Record response to the why.	Look at this circle. It shows (name local city/town). Please, draw a circle which correctly shows (name local district). Why did you put the circle showing (name local district) there?
5. Show child the circle on page 5. 3.3 Record response to the why.	Look at this circle. It shows (name nation or country). Please, draw a circle which correctly shows (name local province). Why did you put the circle showing (name local province) there?
6 Show child the circle on page 6. 3.3 Record response to the why.	Look at this circle. It shows (name local city/town). Please, draw a circle which correctly shows (name local province). Why did you put the circle showing (name local province) there?
7 Show child the circle on page 7. 4.3 Record response to the why.	Look at this circle. It shows (name local province). Please, draw a circle which correctly shows (name nation or country). Why did you put the circle showing (name nation or country) there?
8 Show child the circle on page 8. 4.3 Record response to the why.	Look at this circle. It shows (name local city/town). Please, draw a circle which correctly shows (name nation or country). Why did you put the circle showing (name nation or country) there?
9. Show child the circle on page 9. 4.3 Record response to the why.	Look at this circle. It shows (name local district). Please, draw a circle which correctly shows (name nation or country). Why did you put the circle showing (name nation or country) there?

APPENDIX V.3.A-D.3

TERRITORIAL DECENTRATION TEST: DIRECTIONS FORM (CONTD.)

APPENDIX V.3.D: SUB-TEST D: TERRITORIAL INCLUSION USING PROPS

Item	Directions	Verbal Instructions
1 1.4	Give the child one gold disc and one tan rectangle. Record response to the why.	Here are two pieces of wood. The gold disc (point) shows (name local city/town) The tan piece (point) shows (name local district). Please, arrange the pieces so that they correctly show (name city/town) and (name district). Why did you put the gold piece there?
2 1.4	Give the child one gold disc and one white rectangle. Record response to the why.	The gold disc (point) shows (name local city/town). The white piece shows (name local province). Please arrange the pieces so that they correctly show (name city/town) and (name province). Why did you put the gold piece there?
3 2.4	Give the child one tan and one white rectangle. Record response to the why.	The gold disc (point) shows (name local district). The white piece (point) shows (name local province). Please, arrange the pieces so that they correctly show (name district) and (name province). Why did you put the tan piece there?
4 2.4	Give the child one tan and one black rectangle. Record response to the why.	The black piece shows (name nation or country). The tan piece shows (name local district). Please, arrange the pieces so that they correctly show (name nation or country) and (name district). Why did you put the tan piece there?
5 3.4	Give the child one white and one black rectangle. Record response to the why.	The black piece shows (name nation or country). The white piece shows (name local province). Please, arrange the pieces so that they correctly show (name nation or country) and (name province). Why did you put the white piece there?
	Give the child one gold disc, one tan, two white, and one black rectangles. Record responses to the whys. The pieces may be identified as often as the child requests.	Here are several pieces of wood. Listen carefully as I tell you what they show. The gold disc (point) shows (name local district). This white piece (point) shows (name local province). This other white piece (point) shows (name a neighbouring province). The black piece (point) shows (name nation or country). Please, arrange the pieces so that they correctly show (name city/town, district, province, neighbouring province, and nation or country).
6 1.4	Point to the gold disc.	Why did you put (name city/town) there?
7 2.4	Point to the tan piece	Why did you put (name district) there?
8 3.4	Point to the white piece showing local province	Why did you put (name province) there?
9 3.4	Point to the white piece showing neighbouring province	Why did you put (name province) there?
10 4.4	Point to the black piece	Why do you have (name province) there? (Or) Why do you have (name nation or country) in that position?

APPENDIX V.4

TERRITORIAL DECENTRATION TEST: RESPONSE AND SCORE FORM

(Behaviour - Explanation)

(After Stoltman, October, 1971)

SUB-TEST A

Item	Response	Score Bv.	Score Ex.
1.	Right Wrong Other _____		0
2.	Yes No Other _____		0
3.	Right Wrong Other _____		
4.	a b c d Why?		
5.	Yes No Other _____		0
6.	Right Wrong Other _____		0
7.	a b c d Why?		
8.	Yes No Other _____		
9.	Right Wrong Other _____		0
10.	a b c d Why?		

Score _____

Remarks:

SUB-TEST B

Item	Response	Score Bv.	Score Ex.
1.	District Province Nation or Country Other _____	Yes No	0
2.	District Province Nation or Country Other _____		0
3.	Province Nation or Country Other	Yes No	0
4.	Province Nation or Country Other _____		0
5.	Nation or Country Kenya World Other _____	Yes No	0
6.	Nation or Country East Africa Other _____		0
7.	City/Town District Other		0
8.	East Africa (or Africa) World Other _____		0
9.	City/Town District Province Other		0

Score _____

Remarks:

APPENDIX V.4.2

TERRITORIAL DECENTRATION TEST: RESPONSE AND SCORE FORM (CONTINUED)

SUB-TEST C			SUB-TEST D		
Item	Response	Score Bv. Ex.	Item	Response	Score Bv. Ex.
1. Why?			1. Why?		
2. Why?			2. Why?		
3. Why?			3. Why?		
4. Why?			4. Why?		
5. Why?			5. Why?		
6. Why?			6. Why? (disc)		
7. Why?			7. Why? (district)		
8. Why?			8. Why? (province)		
9. Why?			9. Why? (Kenya)		
			10. Why? (nation or country)		
	Score			Score	

Remarks:

Remarks:

APPENDIX V.5.A

THE THREE MOUNTAINS CO-ORDINATION OF PERSPECTIVES TEST:
DESCRIPTION AND PROCEDURES
(After Laurendeau and Pinard's 1970: 310-320 and 452-457,
Standardised Version of Piaget and Inhelder's (1956: 209-246) Test)

I MATERIALS:

a. Three cones of thin cardboard, representing mountains or huts or houses:
   i. One red one (diameter: 20 cm; height: 11.5 cm);
   ii. One blue one (diameter: 14 cm; height: 75 cm); and
   iii. One yellow one (diameter: 9 cm; height: 5 cm (see Figure V.2.1, page 266).

b. One piece of green cardboard (52 x 52 cm), on which three circles showing the positions of the cones are marked. The square base is divided into 4 smaller pieces of equal size (26 cm on a side) by strips of canvas or thick black lines.

c. Nine cards 814x18 cm), illustrating the three cones from various perspectives, as in Figure V.3, page 268.

d. One small man/woman of modelling clay (maximum height: 3 cm).

II PROCEDURAL INSTRUCTIONS:

Place the three cones on the green cardboard (at the three positions indicated by the circles) and place the arrangement in front of the S so that the yellow cone (small) is to his right, the blue cone (medium) is to his left, and the red cone (large) is behind the other two. Explain the material to the S, saying:

1. "Now, we are going to play with some mountains (huts, tents, etc.) You see, I have three mountains: a red one, the biggest one; a blue one, a little smaller; and then the yellow one, which is very small. I also have a small man/woman (show the modelling clay man/woman). You can see how small he/she is. So the mountains are very big for him/her, because he/she is very small.

   The man/woman, right now, is going for a walk around the mountains, and he/she is going to take some pictures of the mountains. He/she has his/her camera (you may show a real camera) with him/her and he/she wants to take pictures of the mountains.

   Now, you have to guess what will be in the pictures that the small man/woman is going to take.

TRAINING OR FAMILIARISATION SESSION OR EXAMPLE:

a. Put the man/woman at A (see Figure V.2.2, page 266) just in front of the child, and say:

1. 'Watch, I am putting the man/woman here (A). Now, what does the small man/woman see? What will the photograph look like when he/she takes it?'

b. Then present cards A and D, and say:

2. 'Try to find which of these pictures the small man/woman sees when he/she is like this.'

c. Let the S/child work. When he/she has made his/her choice (correct or not), explain the problem to him/her in the following way:

3. 'You see, the man/woman is placed right in front of you. So, he/she sees the same thing that you do: he/she sees the red mountain in the back, and the blue one to the left here, and then the yellow one to the right, here. So you see, he/she sees this picture (designate Card A, the correct response). On this picture, the red one is in the back, then the blue one is to the left and the yellow one is to the right, in front of the red one. On the other picture (show Card D), the red one is in front of the yellow one, and the blue one is on the wrong side. To see it like this, he/she would have to go somewhere else, do you understand?'

d. Repeat these explanations if necessary, but refrain from adding to those which were selected. In particular, never say to the S/child which position corresponds to Card D, and, above all never place the S/child at position D in order to show him/her that Card D corresponds to a possible point of view.

FIRST PART (RECOGNISING THE CARD)

PROBLEM I:

a. Put the man/woman at F (Figure V.2.2, page 266), and say:

1. 'Now, the man/woman is there (F), and he/she is taking a picture'.

b. Present Cards: G - A - D - F - H (arranging them in that order in front of the child/S in a horizontal line, Card G being the first one on the right in relation to the S/child.

Then say:

2. 'Now you see that I have some pictures of the three mountains. You are going to tell me which of these photographs the man/woman is going to take when he/she is placed there (designate the man/woman placed in F). Show me the picture that the man/woman sees when he/she is there.'

Note: If the S/child wants to move so that he/she sees better what the man/woman sees, it is absolutely necessary to stop him/her from doing so. Note carefully which picture(s) the S/child chooses.

*c. If the S/child proposes a single solution, question him/her first on the card which he/she selected as the right one:

(i) 'Explain to me why you say that he/she can see that one?'

d. Note his/her explanation carefully. Then ask him/her, successively pointing to each of the cards which he/she considers to be wrong.

(ii) 'And that one, you are sure he/she does not see that one? Explain to me why he/she cannot see that one.'

e. Note verbatim all of the child/S's responses and always make sure he/she justifies his/her responses.

*f. If the S/child proposes several solutions, first ask him/her:

(i) 'Which one is the best one of all? Explain to me why that one is the best.'

g. Note his/her explanation carefully. Then take each of the cards which he/she chose at first, but which he/she rejected when he/she chose the best one, and ask for each one:

(ii) 'And that one, you just chose a little while ago. Why do you think it is not right, why do you think that the man/woman does not see that one?'

h. Finally, take each of the cards which the S/child had just considered as the wrong ones, and ask for each one:

(iii) 'Explain to me why he/she does not see that one?'

i. Note all the S's/child's responses verbatim.

PROBLEM 2:

Place the man/woman at C (Figure V.2.2, page 266), and proceed as in the preceding problem, but this time present cards: E - C - F - A - B (placing them in that order in front of the S/child and in a horizontal line, Card E being the first one on the right in relation to the child).

PROBLEM 3:

a. First ask the S/child to place himself/herself at E (beside the Experimenter), saying, for example:

1. 'Now, you are going to sit beside me to see the mountains the way I see them. What do you see when you are here? Make yourself very small like the small man/woman encourage the S/child to bend down) and look at the mountains very carefully so that you can tell me what you see. Which mountains do you see?'

b. Note the child/S's response and, if he/she says he/she sees three mountains (when in reality he/she sees only two of them), do not insist further.

c. Then put the man/woman at B (Figure V.2.2, page 266), and proceed as in the preceding problems, but this time present cards: B-I-E-D-A (placing them in that order in a horizontal line in front of the S/child, Card B being the first one on the right in relation to the S/child).

SECOND PART (LOCATING THE MAN/WOMAN)

a. Ask the S/child to return to A, saying, for example:

1. 'Now, you are going to go back to the place where you were before and we are going to play another game.
Now, you are going to take the small man/woman.
I am going to show you the pictures and you are going to try to find where the small man/woman was when he/she took the pictures that I am going to show you and then you will place the small man/woman in the place where he/she has to be to take a picture like that.'

PROBLEM 1:

b. Present Card C, and say:

2. 'Look very carefully at this picture and put the small man/woman where he/she was when he/she took this photograph. Put the man where he/she has to be to see the mountains like this.'

N.B: If the S/child wants to move so that he/she can find the correct position more easily, do not let him/her do so. Note the exact position where the S/child places his/her man and, if he/she places him/her successively at several positions, indicate very clearly the order and the location of these successive positions.

If the S/child places the man/woman in the centre of the board, or right at the foot of one of the mountains, instead of putting him/her on the edge of the cardboard base, allow him/her to do so and make no comment.

*c. If the S/child places his/her man/woman at a single position, simply ask him/her:

1. 'Explain to me why you put the little man/woman there. Tell me how you know that the man/woman sees the same thing as in the picture.'

*d. If the S/child places his/her man at several positions successively, note them first, and then ask him/her simply:

i. 'Which place is best, do you think? Choose the best of all ..... Explain to me why you think that that is the best place.'

e. Note all the responses made by the S/child verbatim.

PROBLEM 2:

Present Card F, and proceed as before.

PROBLEM 3:

Present Card B, and proceed as before.

PROBLEM 4:

Present Card E, and proceed as before.

PROBLEM 5:

Present Card I, and proceed as before, except if the S/child notices that the card is wrong. In that case, ask him/her to explain why such a photograph is impossible.

Note: Each S's/child's responses must be separately recorded and scored on the Response Record Sheet (Appendix V.5.B, page 476).

APPENDIX V.5.B

THE THREE MOUNTAINS CO-ORDINATION OF PERSPECTIVES TEST

RESPONSE RECORD SHEET*

SECTION	Problem	Response			Explanation/Remarks
		Correct	Wrong	Score	
I	A				
	B				
	C				
Sub-total (3)					
II	C				
	F				
	B				
	E				
	I				
Sub-total (5)					
TOTAL 8					

Stage Attained**

0 = Incomprehension or Refusal to respond _____

1 = Complete Egocentrism

1A = Overt Egocentrism _____

1B = Pseudo Decentration _____

2 = Partial Decentration

2A = No, or one, success out of 3 is recorded; most responses are egocentric _____

2B = Success on 2 of 3 problems; partial or absolute failure on 3rd problem _____

3 = Total Operational Co-ordination of Perspectives
All choices are correct and explanations justifiably sound, 3 correct decentrations are achieved. _____

* After Laurendeau & Pinard (1970: 344-403).

** These stages were assigned according to the scores attained in Section I of the SCDT.

APPENDIX V.6.A

THE PORTABLE ROD-AND-FRAME TEST

PROCEDURAL INSTRUCTIONS

(After Oltman, P.K., (1968) and Dasen, P.R. (1978))

NOTE: 1. Apparatus must be on sturdy table and be level.
2. Before S enters the room, be sure the Frame or (Square) box is not tilted, and that the curtain is closed.

At the door, greet the S/child and ask:

1. "Now _____, can you see that flag/telegraphic/ elec-
(S's Name)
tricity pole?" (Any vertical feature in the compound around the testing room can be used for reference in this section).

2. "What would you say the flag/telegraphic/electricity-pole is staying like?" O.K., standing straight _____.

N.B: If the child/S says 'alright', or does not respond, then ask:

3. "Is it standing, or is it lying down?"

4. "Is it straight, or is it leaning over, or slanting?"

NOW FACE THE ROOM AND REFER TO THE WALL OPPOSITE THE DOOR. ASK:

5. "What about that wall; what would you say it is like?"
(If there is no answer, ask:)

6. "Is it standing, or is it lying down?"

7. "Is it straight, or is it leaning over, or slanting?"

EXPERIMENTER SITS DOWN. BEFORE SEATING S/CHILD IN FRONT OF APPARATUS, EXP. SAYS:

8. "Now, _____ sit here on this chair, and I show you
(S's Name)
another pole. In this task, we want to find out how well you can determine or tell the UPRIGHT, or the VERTICAL, under various conditions."

(REFERRING TO THE MODEL):

9. "Can you see that this pole is straight and vertical like that flag/telegraphic/electricity-pole?"

10. "Now, look, we want to fix it in such a way that it will be straight like the flag/telegraphic/electricity-pole. I will move this little by little so that it fits. I want you to tell me to move it again until it fits, and you tell me to stop. Are there any questions?"

11. "Now, let us stand and go there so that I can show you that 'box'."

12. SEAT S/CHILD PROPERLY IN FRONT OF APPARATUS AND ADJUST HEAD REST. S's/CHILD'S HANDS MUST BE IN HIS/HER LAP, NOT TOUCHING TABLE. TELL S/CHILD TO KEEP HIS/HER HEAD IN THE REST AT ALL TIMES, WITH CHIN ON SUPPORT.

TRIAL 1: a. Show Square box/Frame first, and then Rod/stick next.

1. 'Can you see that square box or Frame whose sides we can see? Look: it can be tilted on this side (Left), and on that other side (Right).'
'Can you also see that Rod/stick in the middle of the Square box/Frame? It can also be tilted on this side (Left), and on that other side (Right).'

(1) b. Adjust Square box/Frame to 28L and the stick/rod to 28L (242°)*.

c. Open curtain. Say/ask:

2. 'Please, tell me the position of the Rod and the Frame.'

d. Record S's/child's response.

(A) e. If he says the Rod is tilted, say:

3. 'I will now turn the Rod slowly until you think it is as straight as the walls of this room or the flag-pole outside. As I said, I will turn it slowly and after each turn, tell me whether it has been turned enough or whether you want it turned some more. Just say: 'MORE' or 'ENOUGH' after each turn. Please, make your decisions quickly. Now: Which way shall I move the rod to make it stand as vertical as the walls of this room or the flag-pole: clockwise or anti-clockwise?'

f. Now move the rod about 3° at a time opposite to the direction in which the S says it is tilted, until he/she reports 'ENOUGH'. Ask the S after he reports the rod vertical

4. 'Is the Rod now vertical - that is: is it as straight as the walls of this room or the flag-pole outside?'

g. If the S should now say that he wants the Rod moved some more in either direction, do so. Close the curtain and record the position of the Rod. (Set apparatus for TRIAL 2).

(B) h. If S says the Rod is vertical at the outset of this first Trial, ask this question:

5. 'In other words, is the Rod as straight/vertical as the walls of the room we are in? That is: is it as straight/vertical as the flag-pole outside?'

i. If S now says the Rod is tilted, give the instructions under (A) e. above.

j. If S repeats that the Rod is vertical, close the curtain and proceed to TRIAL 2.

Give the instructions concerning the straightness/verticality of the Rod as in (A) e. above) on the TRIAL 1 on which he says that the Rod is tilted.

TRIAL 2: a. Make sure curtain is closed.

(2) b. Leave the Frame/square box at 28L and adjust the Rod/stick to 28R (298°)

c. Open the curtain and say to the S:

1. 'Would you tell me now and at the beginning of all subsequent Trials whether the Rod and Frame are as straight/vertical as

the walls of this room, or tilted; and if the Rod is tilted, whether the Rod should be moved clockwise or counter-clockwise to be made as vertical as the walls of this room.'

d. If the S asks you to turn the Rod, do so until he says: 'ENOUGH'.

e. Ask him again:

2. 'Is the Rod now vertical - that is: is it as straight/vertical as the walls of this room?'

f. Do not ask the above question on subsequent trials.

g. Close curtain.

h. Record adjustment. Proceed to the next trials, using Instruction 1 in Trial 2 above only and the following settings, and remembering to record all adjustments on the sheet:-

[(Rod 0 (270)]

TRIAL 3: Frame 28R Rod 28R (298°)

TRIAL 4: Frame 28R Rod 28L (242°)

TRIAL 5: Frame 28L Rod 28L (242°)

TRIAL 6: Frame 28L Rod 28R (298°)

TRIAL 7: Frame 28R Rod 28R (298°)

TRIAL 8: Frame 28R Rod 28L (242°)

CONTROL
TRIAL 9: Frame 0 Rod 28L (242°)

i. If at any time after the Rod has been adjusted on a given trial the S should say that he wants it moved a bit more in either direction, please do so.

j. If the S should take more than 5 seconds on any trial before saying 'MORE' or 'ENOUGH', tell him: 'PLEASE, MAKE YOUR DECISIONS QUICKLY.'

k. If the S should repeatedly say: 'MORE' or 'ENOUGH' before the turn of the Rod is completed, say to him: 'PLEASE, WAIT UNTIL I HAVE COMPLETED THE TURN.'

l. Check from time to time to determine whether the S's head is in the proper position in the headrest. Attaching the elastic cord around the back of S's head is recommended. (This must not be tight, but should only rest lightly on the back of the neck).

m. It is recommended that some adjustment in table or chair height be possible to accommodate subjects who are shorter or taller than average. An adjustable drummer's chair, available in a music shop, makes an excellent seat. Otherwise, a supply of telephone books can be used to improvise.

n. If the S on any trial gives a deviation larger than 28° or sends the Rod in a direction opposite to the tilt of the Frame, or does anything else that seems 'strange' the Experimenter should place his hand lightly on the plastic top of the enclosure and ask the S:

'DO YOU SEE MY HAND THROUGH THE WALL OF THE BOX? IS IT ON THE TOP, BOTTOM, LEFT SIDE OR RIGHT SIDE OF THE BOX? IN OTHER WORDS, IS IT NEAREST THE CEILING (ROOF), THE FLOOR, THE LEFT WALL OR THE RIGHT WALL OF THE ROOM WE ARE IN?'

o. Record the S's reponse. Gross shifts in the axes of the S's perceived space sometimes occur, and will be revealed by this disorientation check.

NOTE: p. To check on task comprehension and error of adjustment without the disturbing frame, a further 'control' trial can be added AFTER TRIAL 8 thus:

Take one measure with Frame at 0° or horizontal, and the Rod starting at 28L (242°). Record the S's response.

(In this case, deviations should usually be within the -2° to +2° range).

q. Use a fresh Response and Score Record Sheet to compile a performance protocol for each of the subjects.

* Figures in the brackets are degrees corresponding to the various positions of the rod, and they should not be disclosed to the S.

APPENDIX V.6.B

PORTABLE ROD-AND-FRAME TEST

RESPONSE AND SCORE RECORD SHEET

1. Code No.: _____ 2. Name of Respondent: _____

2. Sex: _____ (M/F) 3. Age: _____ (Years) _____ (Months)

5. School: _____ 6. Std./Form: _____

7. Study: The Development of Territorial Decentration in Children: A Study of Piaget's Spatial Stages in Relation to the School Geography Curriculum in the Republic of Kenya.

8. Experimenter: James Lwanga-Lukwago 9. _____ (Date/Month/Year of Experiment)

Trial	Rod	Frame	Degrees Deviation	Comments
1	2	L		
2	R	L		
3	R	R		
4	L	R		
5	L	L		
6	R	L		
7	R	R		
8	L	R		
'CON-TROL' TRIAL	L	0°		

APPENDIX V.7.A

THE CLASS INCLUSION TEST (CIT)

MATERIALS: Groups of miniature or toy domestic animals (10 in each group) to represent cows, goats, and sheep; a doll of a man and a woman to represent the animal herder/keeper; and two cardboard paper sheets (18x18 cm), which were marked as "Set 1" and "Set 2", respectively.

PROCEDURAL INSTRUCTIONS:

IDENTIFICATION SCHEME:

C = Cow

S = Sheep

O = Other (goats)

A = Animals

E = Experimenter

Ss = Subjects (Sign. = S)

VOCABULARY CHECKS:

To ascertain knowledge of names of animals by Ss, E arranges animals in sets of cows, sheep, and goats, and asks S, pointing to each type:

C (Cows):

"What are these called?" (If answer given is "animals", ask:)
"What kind/type of animals?"

S (Sheep) and O (Goats):

(Ask as for cows above).

A (Animals):

(Combine C and S, and ask:)
"What are all these together called?" (If S says "cows and sheep", ask:)
"What can they all be called using one name?" (Animals).

S's (Child's) ACTIVITY/RESPONSE TO E's INSTRUCTIONS:

I. QUESTIONS USING ONE SET OF ANIMALS:

1. CCSSSS. Give: + C, = A.

(Pointing to the model) - "Look at this man's or woman's animals. This (your) man/woman also wants the same number of animals, but he/she wants more cows than that man's or woman's. Now give him/her what he/she wants."

2. CCOOOO. Give: + C, = A.

(Pointing to the model man/woman) - "This (your) man/woman now wants the same number of animals as this (my) man/woman; but that (your) man/woman wants more cows than the first (my) man/woman. Now, give your man/woman what he/she wants."

3. CCCCSS. Give: - C, = A.

(Pointing to the model man/woman) - "This (your) man/woman now wants the same number of animals as this (my man's/woman's; but he/she does not want as many cows as this (my) one, he/she (your) wants fewer.

4. CCCCOO. Give: - C, = A.

Use the same instructions as those in No. 3 above.

POSSIBLE MODIFICATIONS (in case S cannot respond to 1 - 4):

a. Reduce number: CCS.

b. One-to-one correspondence: CS.

c. In 1. and 2.:

Give only C, = A.

(Pointing to the model man/woman) - "Look at this (my) man's/woman's animals again. This (your) man/woman wants the same number of animals as this (my) one; but wants only cows.

In 3. and 4.:

Give no C, = A.

(Pointing to the model man/woman) - "Look at this (my) man's/woman's animals now. This (your) man wants the same number of animals as this (my) one; but your man/woman does not want any cows."

II. QUESTIONS USING TWO SETS OF ANIMALS:

1. CCSSSS CCCCSS.

a. + C (more cows):

(Pointing to the two model men/women) - "Look at this man's/woman's animals, and that man's/woman's animals. Is there any with more cows than the other one?" (If S answers: 'Yes', then ask: "Which one?" - (S points to man/woman with more cows).

b. +A (more animals):

"Is there any man/woman with more animals than the other one?" -
(If S answers: 'Yes', then ask:
"Which one?")

c. +S (more sheep):

(Use the same questioning schedule as above for animals).

c. +A (more animals):

(As in 1.b. above).

2. CCCOOOO CCCCOOO

Use the same questioning schedule as for: +C (more cows), and: +A (more animals) above.

APPENDIX V.7.B

CLASS INCLUSION TEST (USING ANIMALS)

RESPONSE AND SCORE RECORD SHEET

1. Code No:_____ 2. Name:_____ 3. Sex (Male/Female):_____

4. Age:_____(Yrs.Mths.) 5. Std./Form:_____ 6. School:_____

S's CHILD'S ACTIVITY TO EXPERIMENTER'S INSTRUCTIONS

IDENTIFICATION SCHEME:

C = Cow; S = Sheep; O= Other domestic animals (Goats); A = Animals.
S = Subject (child).

Note: Each question is scored: + (Correct)* or 0 (-) (Incorrect).

I. QUESTIONS USING ONE SET OF ANIMALS:

		(Circles S's Response)		Comments (if any)
1. C C S S S S.	Give: +C, = A	-	+	
2. C C O O O O.	____ do _____	-	+	
3. C C C C S S.	Give: -C, = A	-	+	
4. C C C C O O.	____ do _____	-	+	
POSSIBLE MODIFICATIONS				
a. Reduce number: C C S		-	+	
b. One-to-one correspondence: C S		-	+	
c. In 1. and 2.: Give only C, = A		-	+	
In 3. and 4.: Give no C, = A		-	+	
II. QUESTIONS WITH TWO SETS OF ANIMALS:				
1. C C S S S S C C C C S S. Which one has:				
a. +C (more cows)?		-	+	
b. +A (more animals)?		-	+	
c. +S (more sheep)?		-	+	
d. +A (more animals)?		-	+	
2. C C C O O O O C C C C O O O. Which one has:				
a. +C (more cows)?		-	+	
b. +A (more animals)?		-	+	
TOTAL SCORE				

* The maximum total correct score is 10.

APPENDIX VI.1

TDT: NUMBERS AND PERCENTAGES OF ALL SUBJECTS IN EACH AGE GROUP CLASSIFIED IN EACH TERRITORIAL DECENTRATION STAGE (TDS) BY REGION

(N = 270)

	Age	11		12		13		14		15		16		17		18		19		20			
	Stage	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	TOTAL	(%ge)
1	3	10	50	7	24.14	11	33.33	11	21.15	5	16.13	17	32.69	0	0	0	0	0	0	0	0	61	22.59
Nairobi	2	8	40	9	31.03	2	6.06	2	3.85	2	6.45	6	11.54	0	0	0	0	0	0	0	0	29	10.74
N = 90	1	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	00	0.0
2	3	1	5	6	20.69	10	30.30	20	38.46	8	25.81	11	21.15	13	39.39	8	61.54	0	0	1	25	78	28.89
Kiambu	2	0	0	3	10.34	2	6.06	2	3.85	5	16.13	0	0	0	0	0	0	0	0	0	0	12	4.44
N = 90	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00	0.0
3	3	0	0	2	6.90	8	24.24	16.	30.77	11	35.48	16	30.77	19	57.58	5	38.46	3	100	3	75	83	30.74
Narok	2	0	0	2	6.90	0	0	1	1.92	0	0	2	3.85	1	3.03	0	0	0	0	0	0	06	2.22
N = 90	1	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01	0.37
Column Totals		20	100	29	100	33	100	52	100	31	100	52	100	33	100	13	100	3	100	4	100	270	100.0

APPENDIX VI.2

TERRITORIAL DECENTRATION TEST: NUMBERS AND PERCENTAGES OF ALL SUBJECTS CLASSIFIED AT EACH TERRITORIAL DECENTRATION STAGE BY AGE

(N = 270)

Age Group	11		12		13		14		15		16		17		18		19		20		TOTAL	
T.D. Stage	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	No.	Percentage
3	11	55	15	51.72	29	87.88	47	90.38	24	77.42	44	84.62	32	96.97	13	100	03	100	04	100	222	82.22
2	08	40	14	48.28	04	12.12	05	9.62	07	22.58	08	15.38	01	3.03	0	0	0	0	0	0	47	17.41
1	01	05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01	0.37
OVERALL COLUMN TOTALS	20	100	29	100	33	100	52	100	31	100	52	100	33	100	13	100	03	100	04	100	270	100.00

APPENDIX VI.3

TDT: PERCENTAGES OF SUBJECTS CLASSIFIED IN EACH TERRITORIAL DECENTRATION STAGE (TDS) BY AGE, SEX AND REGION

(N = 270)

Region/ Sample	Age	11		12		13		14		15		16		17		18		19		20	
	Sex	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
	Stage																				
1	3	72.73	18.18	6.67	40.0	10.34	27.59	23.40	0.0	16.67	4.17	18.18	20.45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nairobi	2	37.50	62.50	21.43	42.86	0.0	50.0	20.0	20.0	14.29	14.29	25.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N = 90	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	9.09	0.0	13.33	28.57	17.24	17.24	23.40	19.15	12.50	20.83	11.36	13.64	25.0	15.62	30.77	30.77	0.0	0.0	25.0	0.0
Kiambu	2	0.0	0.0	7.14	14.29	0.0	50.0	20.0	20.0	28.57	42.86	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
N = 90	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3	27.27	0.0	0.0	13.33	10.34	17.24	27.66	6.38	4.17	41.67	25.0	11.36	25.0	34.38	30.77	0.0	100.0	0.0	50.0	25.0
Narok	2	0.0	0.0	0.0	14.29	0.0	0.0	0.0	20.0	0.0	0.0	0.0	25.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
N = 90	1	0.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX VI.4

TDT: ATTAINMENT OF TERRITORIAL DECENTRATION STAGE III (TDS.3) FOR ALL SUBJECTS BY AGE CATEGORIES (N = 270)

CATEGORY	AGE RANGE	TOTAL NUMBER (n) OF SUBJECTS IN AGE RANGE/ CATEGORY	NUMBER OF Ss. SUCCESSFUL IN ATTAINING TDS.III (FIGURES IN BRACKETS INDICATE NUMBER OF FAILURES)	PERCENTAGES OF SUCCESS (OR FAILURE) IN ATTAINING TDS.III (N = 270)
1	11 - 13.11	82	55 (27)	67.07 (32.93)
2	14 - 15.11	83	71 (12)	85.54 (14.46)
3	16 - 20.0	105	96 (9)	91.43 (8.57)
	OVERALL TOTALS N = 270		222 (48)	82.22 (17.78)

APPENDIX VI.5.A, B AND C

SUMMARY STATISTICS FOR THE REGRESSIONS OF TDTB, TDTE AND TDTT ON THE VARIABLES SHOWN IN THE FIRST COLUMN

(N = 270)

Variables	Multiple Determination Coefficients (R)	R^2	Change	Simple R	Estimated Regression Coefficients (β)
	VI.5.A: FOR TDTB AS DEPENDENT VARIABLE				
Age	0.367	0.135	0.135	0.367	0.384
SCDT1	0.385	0.149	0.014	0.125	0.242
CD	0.396	0.157	0.008	0.130	0.183
SCDT2	0.400	0.159	0.003	0.141	0.146
CIT	0.404	0.163	0.004	-0.042	-0.135
PRFTR	0.410	0.168	0.005	-0.065	-0.337
PRFTT	0.414	0.172	0.004	-0.021	0.213
PRFTL	0.415	0.172	0.001	0.019	-0.145
(CONSTANT)					30.44
	VI.5.B: FOR TDTE AS DEPENDENT VARIABLE				
Age	0.332	0.110	0.110	0.331	0.260
SCDTT	0.348	0.121	0.011	0.147	0.105
CD	0.359	0.129	0.008	0.115	0.122
CIT	0.364	0.133	0.004	-0.041	-0.101
PRFTR	0.369	0.136	0.004	-0.056	-0.294
PRFTT	0.377	0.142	0.006	-0.006	0.194
PRFTL	0.378	0.143	0.001	0.035	-0.127
SCDT2	0.379	0.143	0.000	0.144	0.378
(CONSTANT					16.47
	VI.5.C: FOR TDTT AS DEPENDENT VARIABLE				
Age	0.362	0.131	0.131	0.362	0.644
SCDTT	0.380	0.144	0.013	0.160	0.346
CD	0.392	0.154	0.009	0.127	0.305
CIT	0.398	0.158	0.004	-0.042	-0.237
PRFTR	0.403	0.163	0.005	-0.063	-0.631
PRFTT	0.409	0.168	0.005	-0.015	0.408
PRFTL	0.410	0.168	0.001	0.026	-0.271
SCDT2	0.410	0.168	0.000	0.146	0.578
(CONSTANT)					46.91